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ASSESSMENT OF RECOVERABLE COAL RESERVES
Wood Mountain Coalfield, Saskatchewan

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MAP LIST

MWM-85-1

AREAS WITH HIGH RELIEF, WOOD MOUNTAIN REGION

SCALE 1:100,000

MWM-85-2

DRILL HOLE COLLAR LOCATION PLAN (WOOD MOUNTAIN REGION)

SCALE 1:100,000

MWM-85-3

DRILL HOLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

(QUANTOCK)

SCALE 1:100,000

MWM-85-4

DRILL HOLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

(WILLOWVALE)

SCALE 1:100,000

MWM-85-5

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS, AND ZONE OF INFLUENCE (0.8 km)

(ROCKGLEN)

SCALE 1:100,000

MWM-85-6

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS, AND ZONE OF INFLUENCE (0.8 km)

(BORDERLAND)

SCALE 1:100,000

MWM-85-7

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS, AND ZONE OF INFLUENCE (0.8 km)

(STONEHENGE)

SCALE 1:100,000

MWM-85-8

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS, AND ZONE OF INFLUENCE (0.8 km)

(KILLDEER)

SCALE 1:100,000

MWM-85-9

RESERVE CATEGORIES OUTLINES (QUANTOCK)

SCALE 1:100,000

MWM-85-10

RESERVE CATEGORIES OUTLINES (WILLOWVALE)

SCALE 1:100,000

MWM-85-11

RESERVE CATEGORIES OUTLINES (ROCKGLEN)

SCALE 1:100,000

MWM-85-12

RESERVE CATEGORIES OUTLINES (BORDERLAND)

SCALE 1:100,000

MWM-85-13

RESERVE CATEGORIES OUTLINES (STONEHENGE)

SCALE 1:100,000

MWM-85-14

RESERVE CATEGORIES OUTLINES (KILLDEER)

SCALE 1:100,000

MWM-85-15

COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(QUANTOCK) SCALE 1:100,000

MWM-85-16

COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(WILLOWVALE) SCALE 1:100,000

MWM-85-17

COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(ROCKGLEN) SCALE 1:100,000

MWM-85-18

COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(BORDERLAND) SCALE 1:100,000

MWM-85-19

COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(STONEHENGE) SCALE 1:100,000

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COLLAR LOCATION WITH RECOVERABLE COAL,WASTE /RECOVERABLE

COAL AND WASTE THICKNESSES

(KILLDEER) SCALE 1:100,000

SUMMARY

Reserves and resources of recoverable coal in the Wood Mountain Coalfield of southern Saskatchewan were assessed by the Ore Reserves Assessment Group in 1985. These reserve and resource quantities are tabulated below:

MEASURED *(Million Tonnes)*	**INDICATED** *(Million Tonnes)*	**INFERRED** *(Million Tonnes)*
	666.5	105

The results show a significant decrease in all categories except in the Indicated category. The restrictive nature of the criteria used for the assessment explains the decrease. The assessment criteria and ORAG's assessment methodologies, used in the exercise, are summarized in the report.

INTRODUCTION

During 1985 the Ore Reserves Assessment Group (ORAG) * assessed the resources of recoverable coal in the Wood Mountain Coalfield of Saskatchewan. This project was undertaken within the confines of the "Assessment of Coal Reserves and Production" project (Code 200800). Tibbets (1) analysed the physical and chemical properties of selected Canadian commercial coals and subsequently, Dyck, et al. (3) assessed the quality and occurence of coal in southern Saskatchewan as part of the Canada-Saskatchewan Coal Resources Evaluation Program (1971-1979). Previously, the Estevan and Willow Bunch coalfields had been evaluated by the Mine Evaluation Group (5,6). In 1978 and parallel to the assessment of Dyck, et al. (3), the resources of the coalfields of southern Saskatchewan were estimated by officers of the Geological Survey of Canada, the Department of Mineral Resources of Saskatchewan and the Saskatchewan Research Council (Economic Geology Report 30, reference 2 to this report).

The present report is based on the computerized data base which was compiled for the previous assessments of the Mine Evaluation Group. In an effort to standardize the assessment procedures ORAG, in cooperation with representatives from the Saskatchewan Power Corporation and the Coal Research Laboratories, redefined the assessment criteria for the evaluation of the Estevan and Willow Bunch coalfields. The same redefined assessment criteria have been used in this evaluation of the Wood Mountain Coalfield.

There are six coal zones in the Wood Mountain region, containing recoverable coal reserves and inferred coal resources, as defined by the evaluation criteria and mining restrictions which are appended to this report. From the stratigraphically highest zone to the lowest zone, the six zones are: (A) Quantock, (B) Willowvale, (C) Rockglen, (D) Borderland, (E) Stonehenge and (F) Killdeer. Each zone was examined separately and the block identifications in subsequent parts of this report refer to the resource categories and the specified zones.

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* The Mine Evaluation Group was renamed the Ore Reserves Assessment Group during 1985.

COMPUTERIZED DATA BASE

Collection of quantitative data for the assessment of the Saskatckewan coalfields began with a drilling campaign in 1972 and 1973. This sampling program covered the four coalfields in southern Saskatchwan (i.e. Estevan, Willow Bunch, Wood Mountain, and Cypress). A total of 705 holes were drilled during this initial phase of the sampling program. Subsequently, the data from 1128 holes were added to the Saskatchewan Coal Data Base (SASCO). The 1978 Federal-Provincial evaluation utilized the complete SASCO file of 1833 holes to estimate the quantities of recoverable coal resources of immediate and future interest in the four coalfields of southern Saskatchewan.

During the 1972-1973 sampling program 133 drillholes were completed in the Wood Mountain map-area. Subsequently another 160 holes produced additional data to the file for the 1978 assessment. The Wood Mountain map-area, as evaluated in this report, coincides with NTS topographic sheet 72G and bounded by 106° to 108° West Longitude and 49° to 50° North Latitude.

The Ore Reserves Assessment Group has restructured the SASCO file to make it compatible with the computer programs developed by the group for reserves and resources evaluation. The modified computer data files and the programs, which have been applied to them, are described in reference 5.

A set of 1:50,000 scale topographic maps, covering NTS sheet 72G, were used as base maps for the present project. The 1:100,000 scale map, generated from the digitization of the topographic maps, combined with the mineability criteria, the drillhole information from the SASCO file and the geological coal limits from GSC Report 30, permitted the Ore Reserves Assessment Group to estimate the recoverable coal reserves and resources of the Wood Mountain Coalfield.

METHODOLOGY

The methodologies used to estimate reserves and the associated resources of recoverable coal in the Wood Mountain map-area are the same as those which were used for estimation of the Estevan and Willow Bunch coal resources by the Ore Reserves Assessment Group in 1985.

This estimation required the following procedures:

A. Preparation of the reference and working maps,

B. Calculation of the Reserves and associated Resources of coal,

C. Tabulation of Reserves and Resources for individual coal zones,

D. Summarization of Reserves and Resources and their comparison with previous estimations.

A. Preparation of maps *

(1) Areas of High relief (Map 85-1)

As a first step in the coal resource estimation process ORAG defined the areas that are non-mineable. An examination of the available 1:50,000 scale topographic maps, covering the Wood Mountain area, revealed that there are very few cultural features (i.e. towns, airports, recreational areas, etc.) which would pre-empt mining operations. However, the topographic relief in the map-area is considerable and it was kept in mind that the large drag-line operations, used in coal mining operations, can work only on flat terrains. According to general concensus, derived from the opinions of various sources, an area with greater than 1 % slope is technically unmineable, although if the overall waste thickness is less than 45 metres, some flattening of the terrain could facilitate stripping operations.

Map 85-1 was constructed by digitizing each 1 kilometre square grid block on the N.T.S. sheets with more than 5 contour lines of different elevations within the block. The slope of these areas is greater than 3.8 %. These blocks are not mineable. The remainder is an optimistic outline of the mineable areas.

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* All maps accompanying this report are at 1:100,000 scale.

(2) Drill hole location map (Map 85-2)

Map 85-2 shows the collar locations and the company drillhole numbers for all drillholes in the Wood Mountain map area. The map was plotted on the basis of the SASCO data file.

(3) Zone of influence and geological coal maps (Maps 85-3 to 85-8)

ORAG has plotted the zone of influence for indicated coal, a square area with 1.6 km long sides centered on each drillhole with recoverable coal in it, as defined by the criteria submitted to our group. The geological limits of the separate coal zones, as shown on the plates accompanying Economic Geology Report 30 (2), were digitized. The digitized files were combined with the drillhole maps of zones of influences to produce Maps 85-3 to 85-8. These are the maps depicting the recoverable coal without consideration of mineability restrictions.

(4) Coal Reserve/Resource outline maps (Maps 85-9 to 85-14)

Maps 85-9 to 85-14 are the coal reserve outline maps. They were produced by integrating the maps showing the topographic restrictions (i.e. Map 85-1) with the appropriate zone map of geological and indicated coal limits (i.e Maps 85-3 to 85-8).

Indicated coal reserves are represented on the maps by blocks labeled "I "(i.e. IA-01, IB-02, etc.). These are square areas, with 1.6 km long sides, centered on those drillhole locations which satisfied the other assessment criteria.

Inferred coal resources are represented on these maps by the blocks which are identified by "N "(i.e. NA-01, NB-01, etc.). These are areas around the perimeters of Indicated coal reserve blocks and within 1.6 km of a sampling point, after the areas with high relief and those outside geological coal limits have been deleted. Inferred coal resources are severely limited in this evaluation by the great number of drillholes which show no recoverable coal, as can be seen on maps 85-3 to 85-8.

These reserve and resource area outlines were first hand drawn and subsequently digitized for computerized storage and plotting.

B. Calculation of Reserves and Associated Resources of Coal

The surfaces corresponding to Indicated reserve blocks and Inferred resource blocks were measured with the digitizer on the local mode. Each measurement was repeated three times and the arithmetic average of the three results were taken as the surface area of the individual reserve and resource blocks (references: Maps 85-9 to 85-14).

Conventional resource evaluation methods were applied to the Wood Mountain data. The procedure involved the following steps:

(1) Reserve and resource areas were outlined and measured with due regard for the mining criteria,

(2) The thicknesses of recoverable coal seams were derived from drillhole information in the SASCO file,

(3) The volumes of coal blocks were calculated by multiplying the area measurements of step (1) with the thicknesses of step (2),

(4) The recoverable coal tonnages were obtained by multiplying the volumes with a volume factor of 0.85 (see page 38). This is as good a value as was available to the Ore Reserves Assessment Group at the time of the assessment. It was determined by officials of the Saskatchewan Power Corporation.

C. Tabulation of the Reserves and Resources for Individual Coal Zones

Block by block recoverable coal quantities are tabulated for the six coal zones

(Tables 2 to 7).

Table 8 is a comparison of the results of the present exercise with the results of the previous estimation of resource quantities which was completed for the 1978 Federal- Provincial study (2).

The more restrictive assessment criteria, used in the present exercise, explain the decrease of recoverable coal for each category. The drillhole spacing, as is evident from the individual zone maps, supports the categorization for Indicated and Inferred coal in the present assessment . The average area of influence per drillhole is tabulated in Tables 9 to 14. An examination of these tables reveals the relatively constant drillhole spacing in the Wood Mountain Coalfield. The overall average area per drillhole is 2.46 km^2, which corresponds to an overall average distance of influence of 0.78 km per hole. This value is very close to the zone of influence criteria used for the Indicated category (2.56 km^2).

The assessment criteria specify a distance of influence of < 0.4 km for Measured coal reserves. In other words the drillhole spacing should be 0.8 km or 0.64 km^2 per drillhole. Such is not the case for any portion of the Wood Mountain area, consequently there are no Measured coal reserves assessed in this report.

In this assessment the criteria for Inferred coal zone of influence is 1.6 x 1.6 km square, however, in most cases this influence is pre-empted by holes which do not meet the other criteria for recoverable coal.

On the scale at which the estimation was done, the individual assessment of each narrow band of non-mineable area is not practical. The allowance for railroads, provincial highways and transmission lines, crossing the assessed area, is negligible. There are no communities or other non-mineable areas underlain by recoverable coal zones.

D. Summarization of Reserves and Resources and their comparison with previous estimations.

The recoverable coal for each coal zone of the Wood Mountain Coalfield is summarized in Table 1(a and b). Table 1 (a) summarizes the coal reserves and 1 (b) includes the associated coal resource quantities which were assessed.

TABLE 1(a)
SUMMARY OF COAL RESERVES
WOOD MOUNTAIN COALFIELD

Coal Zone	Measured (Million Tonnes)	Indicated (Million Tonnes)	Total (Million Tonnes)
Quantock		21.1	21.1
Willowvale		13.6	13.6
Rockglen		199.1	199.1
Borderland		306.9	306.9
Stonehenge		78.5	78.5
Killdeer		47.3	47.3
TOTAL:		666.5	666.5

TABLE 1(b)
SUMMARY OF COAL RESERVES AND RESOURCES
WOOD MOUNTAIN COALFIELD

Coal Zone	Measured (Million Tonnes)	Indicated (Million Tonnes)	Inferred (Million Tonnes)
Quantock		21.1	3
Willowvale		13.6	11
Rockglen		199.1	10
Borderland		306.9	26
Stonehenge		78.5	26
Killdeer		47.3	29
TOTAL:		666.5	105

TABLE 2
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Quantock Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes*)
IA-01	11.61	0.97	9.57
IA-02	5.64	0.47	2.25
IA-03	10.17	0.55	4.75
IA-04	5.17	0.31	1.36
IA-05	1.77	0.68	1.02
IA-06	2.54	0.31	0.67
IA-07	2.89	0.62	1.52
NA-01	2.98	0.83	2.10
NA-02	2.32	0.47	0.93

TABLE 3
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Willowvale Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes*)
IB-01	1.36	0.31	0.36
IB-02	2.56	0.16	0.35
IB-03	2.92	0.54	1.34
IB-04	10.40	0.42	3.72
IB-05	2.56	0.92	2.00
IB-06	2.56	0.76	1.65
IB-07	4.50	0.77	2.95
IB-08	2.56	0.31	0.68
IB-09	3.66	0.16	0.50
NB-01	1.55	0.24	0.32
NB-02	2.25	0.54	1.03
NB-03	2.14	0.54	0.98
NB-04	3.90	0.92	3.05
NB-05	3.88	0.84	2.77
NB-06	3.90	0.77	2.55

TABLE 4
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Rockglen Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes*)
IC-01	11.01	0.34	3.18
IC-02	58.44	1.01	50.17
IC-03	2.56	1.07	2.33
IC-04	97.15	1.69	139.56
IC-05	6.47	0.71	3.90
NC-01	3.85	0.34	1.11
NC-02	3.14	1.01	2.70
NC-03	2.37	1.01	2.03
NC-04	3.40	1.01	2.92
NC-05	1.50	1.07	1.36

TABLE 5
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Borderland Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes)*
ID-01	107.68	2.04	186.72
ID-03	18.10	1.28	19.69
ID-04	54.63	1.84	85.44
ID-05	1.99	0.73	1.23
ID-06	5.09	0.38	1.64
ID-07	6.18	2.31	12.13
ND-01	1.56	2.04	2.71
ND-03	13.79	1.28	15.00
ND-04	5.04	1.84	7.88

TABLE 6
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Stonehenge Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes*)
IE-01	4.53	0.74	2.85
IE-02	8.21	1.30	9.07
IE-03	48.21	1.50	61.47
IE-04	3.00	2.01	5.13
NE-01	15.17	1.20	15.47
NE-02	8.42	1.50	10.74

TABLE 7
DETAILED RECOVERABLE COAL RESERVES
Wood Mountain Coalfield

Killdeer Coal Zone

Surface Identification	Surface (km^2)	Thickness (metres)	Tonnage ($\times 10^6$ *Tonnes*)
IF-01	4.23	0.76	2.73
IF-02	2.42	2.42	4.98
IF-03	18.11	0.85	13.08
IF-04	1.62	0.92	1.27
IF-05	10.56	2.02	18.13
IF-06	1.59	2.02	2.73
IF-07	0.77	0.31	0.20
IF-08	4.04	1.22	4.19
NF-01	26.94	1.03	23.59
NF-02	2.32	0.31	0.61
NF-03	0.73	1.22	0.76
NF-04	4.14	1.22	4.29

TABLE 8
COMPARISON OF THE PRESENT AND THE PREVIOUS COAL RESERVE/RESOURCE ESTIMATIONS
Wood Mountain Coalfield

	Estimation	Resource Categories in Million Tonnes			
Coal Zone	**Sources**	**Measured**	**Indicated**	**Total M&I**	**Inferred**
Quantock	GSC/1978	4.35	8.7	13.1	23
	ORAG/1985		21.1	21.1	3
Willowvale	GSC/1978	8.26	17.7	26.0	26
	ORAG/1985		13.6	13.6	11
Rockglen	GSC/1978	92.67	241.9	334.6	245
	ORAG/1985		199.1	199.1	10
Borderland	GSC/1978	116.71	298.6	415.3	440
	ORAG/1985		306.9	306.9	26
Stonehenge	GSC/1978	36.83	114.7	151.5	203
	ORAG/1985		78.5	78.5	26
Killdeer	GSC/1978	18.55	51.6	70.2	178
	ORAG/1985		47.3	47.3	29
All Zones	GSC 1978	277.37	733.2	1010.7	1115
	ORAG 1985		666.5	666.5	105
Difference	ORAG85/GSC78	-277.37	-66.7	-344.2	- 1010

Notes:

1; *GSC/78 from TABLE 12 REPORT 30 with metric conversion by D.F.W.*

2; *ORAG/85 calculations by A.B, R.B. and D.F.W. from ORAG data files*

3; *No deduction has been made for railway, transmission line and road allowances.*

(WARNING! *The G.S.C. tonnages are* **In situ** *tonnages. The ORAG tonnages are* **recoverable** *tonnages.)*

TABLE 9
AVERAGE AREA PER DRILLHOLE
WOOD MOUNTAIN COALFIELD

Quantock Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
IA-01	5	11.61	2.32
IA-02	2	5.64	2.82
IA-03	4	10.17	2.54
IA-04	2	5.17	2.59
IA-05	1	1.77	1.77
IA-06	1	2.54	2.54
IA-07	1	2.89	2.89
TOTAL:	16	39.79	2.49

TABLE 10
AVERAGE AREA PER DRILLHOLE
WOOD MOUNTAIN COALFIELD

Willowvale Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
IB-01	1	1.36	1.36
IB-02	1	2.56	2.56
IB-03	3	2.92	0.97
IB-04	4	10.40	2.60
IB-05	1	2.56	2.56
IB-06	1	2.56	2.56
IB-07	2	4.50	2.25
IB-08	1	2.56	2.56
IB-07	2	3.66	1.83
TOTAL:	16	33.08	2.07

TABLE 11
AVERAGE AREA PER DRILLHOLE
WOOD MOUNTAIN COALFIELD

Rockglen Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
IC-01	4	11.01	2.75
IC-02	24	58.44	2.44
IC-03	1	2.56	2.56
IC-04	38	97.15	2.56
IC-05	3	6.47	2.16
TOTAL:	70	175.63	2.51

TABLE 12
AVERAGE AREA PER DRILLHOLE
WOOD MOUNTAIN COALFIELD

Borderland Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
ID-01	36	107.68	2.99
ID-03	7	18.10	2.59
ID-04	20	54.63	2.73
ID-05	1	1.99	1.99
ID-06	2	5.09	2.55
ID-07	2	6.18	3.09
TOTAL:	68	193.67	2.85

TABLE 13
AVERAGE AREA PER DRILLHOLE WOOD MOUNTAIN COALFIELD

Stonehenge Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
IE-01	2	4.53	2.27
IE-02	3	8.21	2.74
IE-03	18	48.21	2.68
IE-04	1	3.00	3.00
TOTAL:	24	63.95	2.66

TABLE 14
AVERAGE AREA PER DRILLHOLE WOOD MOUNTAIN COALFIELD

Killdeer Coal Zone

Surface Identification	Number of Drillholes	Total Area (km^2)	Area/Hole (km^2)
IF-01	2	4.23	2.12
IF-02	1	2.42	2.42
IF-03	7	18.11	2.59
IF-04	1	1.62	1.62
IF-05	4	10.56	2.64
IF-06	1	1.59	1.59
IF-07	1	0.77	0.77
IF-08	2	4.04	2.02
TOTAL:	19	43.34	2.28

DISCUSSION

The comparison of recoverable coal figures for 1978 and 1985 illustrates the importance of mining criteria selection and parameter estimations and their effect on the recoverable coal tonnage results.

Four major quantitative aspects should be pointed out about the present assessment:

1, Mining criteria on recoverable coal thickness restrictions:

The present criteria are much more restrictive than the criteria selected for the 1978 exercise on the Wood Mountain Coalfield.

2, Zone of influence:

The continuity of Wood Mountain coal zones is assumed to be compatible with the parameter used for the distance of influence of the Indicated category if more than one drill hole contain recoverable coal in the area to be estimated. An isolated drill hole containing recoverable coal is considered to have no coal zone continuity. The Inferred category outline is based on the geological continuity of the coal zones, as interpreted previously for the 1978 report (reference 2) and from the drilling information available at the time of the present exercise.

3, Density:

The validity of the sampling, used to estimate the average density of coal in a specific coalfield, influences subsequent tonnage estimates. The present evaluators assume that this density does not vary appreciably within a coal zone or between different coal zones. This assumption is the consequence of the lack of representative density sampling data.

4, Topography:

After consideration of the locally occuring strong relief and poor accessibility in the assessed region it was decided to use a special limiting criterion for the assessment of the Wood Mountain Coalfield. However the application of this topographic criterion affects the overall tonnage by less than 2 %.

Note: Some other aspects on the dependability and precision of the results are discussed in a previous similar report for Estevan Coalfield (7) and the Willow Bunch Coalfield (8).

CONCLUSIONS and RECOMMENDATIONS

The dependability of the recoverable coal assessment of Wood Mountain Coalfield hinges on the precision of the estimated averages of two sets of variables: the recoverable coal thickness and the coal density. The volume of each Indicated or Inferred block is calculated by multiplying the average recoverable coal thickness with the measured surface of a block to be estimated. The dependability of the estimated volume is directly related to the lateral geometric continuity and variability of the recoverable coal thickness. The surface outline of a block is based on drill hole information, available at the time of the study, and on the judgement of the geologist, who decides about the limits of recoverable coal. The exact location of the limits of recoverable coal is always questionable when it is based only on surface drill hole information. The recoverable coal tonnage is calculated by multiplying the volume of a block by the estimated *density factor* of the same block. For the present assessment we used one single value as *density factor* for all the blocks of the entire coalfield. The *density factor* is dependable only if it is estimated from a representative sampling of each coal zone. Consequently we can conclude that a single *density factor* value is dependable only if there is a very low variability of the density in each coal zone in the assessed area.

As a consequence of the drill hole spacing and the limited amount of information gained from the drill holes, we were forced to assume a low variability and high continuity of the recoverable coal thickness to produce an acceptable assessment of recoverable coal.

Any future assessment of the Wood Mountain Coalfield will be justified only after a substantial number of drill holes will be drilled, at least in some subareas.

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APPENDIX 1

STRIPPING RATIO ESTIMATION OF THE WOOD MOUNTAIN COALFIELD

It is presumed that any eventual mining of coal in the Wood Mountain Coalfield will be done by strip mining methods. In strip mining, like in any other surface mining, the ratio of the reserve covering waste quantity to the quantity of reserve underneath it is a primary factor of consideration in the decision making process, concerned with the future of a mining project. This ratio is the *stripping ratio*, expressed by a singular common fraction.

Over a large area, where numerous mining projects could be envisaged in the future, the concept of the *stripping ratio* becomes somewhat clouded. According to individual preference one could interpret it as the ratio of the average waste thickness to the average coal thickness or the average of the waste/coal thickness ratios. The first is equivalent to the *stripping ratio* of a singular mining project because the ratio of the average of all sampled waste thicknesses to the average of all sampled coal thicknesses is equal to the ratio of the total estimated waste to the total estimated coal. In other words, it is a ratio of averages . The second is the average of all individual waste/coal thickness ratios, calculated at each sampling point. This latter is an average ratio.

The ratio of averages and the average ratio are usually not equivalent, with the exception of two limiting cases. These limiting cases occur either if the array of all sampled waste thickness values is in perfect linear correlation with the array of all sampled coal thickness values, or if the linear correlation between the two sample arrays is totally lacking. In statistical parlance the correlation coefficient "r" in the first case is ± 1, in the second case it is 0.

It is customary that some variables, distributed over a large area, are contoured on maps or plans to facilitate the overview of their behaviour. During the estimation of the recoverable coal in the Wood Mountain Coalfield it was suggested to the Ore Reserves Assessment Group that the *stripping ratio* over the Wood Mountain Coalfield should be also contoured, at least in those sub-areas where the density of the sampling points allows it. Unfortunately the detailed investigation of the waste/coal thickness ratios disclosed that contouring them as *stripping ratios* is not possible for the following reasons:

From the above described two concepts which could be substituted for the *stripping ratio* of a singular mining project regionally, i.e., the ratio of averages and the average ratio, the first is a singular, invariable value. Consequently it is not contourable. The second would be contourable only if the denominator of the individual waste/coal thickness ratios of all considered sampling points would be constant. In such a case the linear correlation coefficient "r" between the waste and coal thickness arrays would be zero. Such is not the case over the Wood Mountain Coalfield. Even if such would be the case the contours over the area would not be *stripping ratio* or waste/coal thickness ratio contours. Rather, they would be properly named as waste thickness contours because only the waste thickness measurements would be variable.

Maps 85-15 to maps 85-20 are drill hole surface plans, showing drill hole collars, and beside each collar a column with the following values:

1. Recoverable coal thickness,
2. Waste/recoverable coal thickness ratio,
3. Waste thickness.

To offer a quantitative overview about the behaviour of the two possible interpretation of the *stripping ratio* concept over the area to the users of the present estimation of the recoverable coal in the Wood Mountain Coalfield, the waste/coal thickness ratios were calculated both as ratios of averages and as average ratios. The detailed tabulation of the two values for each individual coal zone are shown on Tables A-1 to A-6 inclusive.

TABLE A-1
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Quantock Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-01	593	22.6	1.1	20.5
IA-01	731	14.1	0.6	23.5
IA-01	926	17.5	0.6	29.2
IA-01	927	10.4	0.5	20.8
IA-01	954	14.8	2.1	7.0
Sub-total:	5	79.4	4.9	101.0
	Ratio of Averages: 16.2		Average Ratio: 20.3	
IA-02	1073	54.3	0.3	181.0
IA-02	1078	16.8	0.6	28.0
Sub-total:	2	71.2	0.9	209.0
	Ratio of Averages: 79.1		Average Ratio: 104.5	
IA-03	647	32.4	0.5	64.8
IA-03	928	11.1	0.7	15.9
IA-03	929	6.2	0.3	20.7
IA-03	1275	19.9	0.7	28.4
Sub-total:	4	69.6	2.2	129.8
	Ratio of Averages: 31.6		Average Ratio: 32.5	
IA-04	932	19.3	0.3	64.3
IA-04	1279	10.7	0.3	35.7
Sub-total:	2	30.0	0.6	100.0
	Ratio of Averages: 50.0		Average Ratio: 50.0	
IA-05	936	24.1	0.7	34.4
IA-06	716	13.2	0.3	44.0
IA-07	713	24.1	0.6	40.2
TOTAL:	16	311.6	10.2	658.4
	Ratio of Averages: 30.5		Average Ratio: 41.2	

TABLE A-2
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Willowvale Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-01	733	41.4	0.3	138.0
IB-02	736	14.3	0.2	71.5
IB-03	814	15.3	0.5	30.6
IB-03	815	32.7	0.6	54.5
IB-03	955	11.8	0.3	39.3
Sub-total:	3	59.8	1.4	124.4
	Ratio of Averages: 42.7		Average Ratio: 41.5	
IB-04	804	18.4	0.3	61.3
IB-04	810	19.0	0.4	47.5
IB-04	813	26.0	0.6	43.3
IB-04	1004	3.7	0.3	12.3
Sub-total:	4	67.1	1.6	164.4
	Ratio of Averages: 41.9		Average Ratio: 41.1	
IB-05	737	25.2	0.9	28.0
IB-06	706	26.8	0.8	33.5
IB-07	744	28.4	1.2	23.7
IB-07	934	29.3	0.3	97.7
Sub-total:	2	57.7	1.5	121.4
	Ratio of Averages: 38.5		Average Ratio: 60.7	
IB-08	709	6.2	0.3	20.7
IB-09	953	2.2	0.2	11.0
IB-09	1103	30.6	1.5	20.4
Sub-total:	2	32.8	1.7	31.4
	Ratio of Averages: 19.3		Average Ratio: 15.7	
TOTAL:	16	331.3	8.7	733.3
	Ratio of Averages: 38.1		Average Ratio: 45.8	

TABLE A-3
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Rockglen Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-01	948	14.4	0.2	72.0
IC-01	949	18.4	0.6	30.7
IC-01	1262	34.2	0.3	114.0
IC-01	1264	21.1	0.3	70.3
Sub-total:	4	88.1	1.4	287.0
	Ratio of Averages: 62.9		Average Ratio: 71.8	
IC-02	710	18.5	1.9	9.7
IC-02	739	5.7	0.8	7.1
IC-02	740	38.0	0.2	190.0
IC-02	744	34.5	0.5	69.0
IC-02	934	34.5	0.3	115.0
IC-02	935	21.1	0.9	23.4
IC-02	937	18.7	0.4	46.8
IC-02	942	7.1	0.7	10.1
IC-02	943	11.4	3.0	3.8
IC-02	951	24.8	3.0	8.3
IC-02	952	26.3	0.5	52.6
IC-02	953	8.5	0.3	28.3
IC-02	1103	39.1	1.3	30.1
IC-02	1106	3.1	1.2	2.6
IC-02	1123	9.7	1.2	8.1
IC-02	1125	4.0	0.9	4.4
IC-02	1126	19.3	1.1	17.5
IC-02	1249	11.7	0.6	19.5
IC-02	1251	12.0	1.2	10.0
IC-02	1252	27.8	1.0	27.8
IC-02	1255	50.4	1.5	33.6
IC-02	1256	15.6	1.2	13.0
IC-02	1257	9.8	0.9	10.9
IC-02	1267	11.4	1.4	8.1
Sub-total:	24	463.0	26.0	749.7
	Ratio of Averages: 17.8		Average Ratio: 31.2	
IC-03	955	19.3	1.1	17.5

TABLE A-3 (cont'd)
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Rockglen Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-04	731	47.2	1.1	42.9
IC-04	738	40.2	0.8	50.3
IC-04	804	33.6	1.2	28.0
IC-04	810	26.6	1.5	17.7
IC-04	811	42.4	0.9	47.1
IC-04	813	49.2	0.6	82.0
IC-04	825	33.9	1.5	22.6
IC-04	826	37.6	3.3	11.4
IC-04	859	8.6	1.5	5.7
IC-04	860	17.5	0.9	19.4
IC-04	926	42.1	1.2	35.1
IC-04	927	43.0	1.4	30.7
IC-04	928	44.4	2.2	20.2
IC-04	929	39.2	2.5	15.7
IC-04	930	40.6	2.8	14.5
IC-04	933	5.6	0.6	9.3
IC-04	950	40.0	0.5	80.0
IC-04	992	3.7	0.6	6.2
IC-04	994	7.1	1.1	6.5
IC-04	997	8.6	0.6	14.3
IC-04	998	5.6	0.6	9.3
IC-04	1001	27.8	2.3	12.1
IC-04	1004	21.7	0.9	24.1
IC-04	1108	20.8	0.7	29.7
IC-04	1110	25.2	2.7	9.3
IC-04	1112	18.1	2.9	6.2
IC-04	1113	30.6	3.0	10.2
IC-04	1115	20.8	2.8	7.4
IC-04	1116	17.8	3.0	5.9
IC-04	1117	18.1	0.2	90.5
IC-04	1118	29.6	3.2	9.3
IC-04	1272	15.3	3.1	4.9
IC-04	1273	47.9	0.8	59.9
IC-04	1274	40.3	2.4	16.8
IC-04	1276	17.8	2.9	6.1
IC-04	1278	44.3	0.4	110.8
IC-04	1279	46.1	3.0	15.4
IC-04	1559	12.6	2.6	4.8
Sub-total:	38	1071.5	64.3	992.3
	Ratio of Averages: 16.7		Average Ratio: 26.1	

TABLE A-3 (cont'd)
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Rockglen Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-05	833	20.5	1.2	17.1
IC-05	995	15.9	0.3	53.0
IC-05	996	15.6	0.6	26.0
Sub-total:	3	52.0	2.1	96.1
Ratio of Averages: 24.8		Average Ratio: 32.0		

TOTAL:	70	1693.9	94.9	2142.6
Ratio of Averages: 17.8		Average Ratio: 30.6		

TABLE A-4
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Borderland Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-01	810	47.9	1.5	31.9
ID-01	826	48.4	2.3	21.0
ID-01	833	37.6	2.7	13.9
ID-01	859	15.0	1.5	10.0
ID-01	860	25.7	1.2	21.4
ID-01	927	44.0	3.1	14.2
ID-01	929	49.2	3.3	14.9
ID-01	933	10.4	1.8	5.8
ID-01	989	15.0	0.3	50.0
ID-01	990	23.2	1.9	12.2
ID-01	991	20.5	2.2	9.3
ID-01	993	6.8	2.3	3.0
ID-01	994	19.6	2.2	8.9
ID-01	995	19.0	2.5	7.6
ID-01	996	19.9	2.4	8.3
ID-01	997	19.3	2.1	9.2
ID-01	998	21.4	1.3	16.5
ID-01	1000	34.2	2.0	17.1
ID-01	1001	37.0	1.9	19.5
ID-01	1002	15.3	1.1	13.9
ID-01	1107	15.3	2.4	6.4
ID-01	1108	39.4	2.4	16.4
ID-01	1109	8.0	0.5	16.0
ID-01	1110	31.4	2.3	13.7
ID-01	1111	25.6	2.0	12.8
ID-01	1112	32.4	2.1	15.4
ID-01	1113	44.8	2.3	19.5
ID-01	1114	7.1	2.2	3.2
ID-01	1116	29.0	3.2	9.1
ID-01	1117	44.0	3.1	14.2
ID-01	1118	36.3	2.4	15.1
ID-01	1269	31.5	2.1	15.0
ID-01	1271	10.3	0.3	34.3
ID-01	1272	25.6	2.0	12.8
ID-01	1276	22.3	2.8	8.0
ID-01	1559	22.6	2.1	10.8
Sub-total:	36	955.0	73.8	531.3
Ratio of Averages: 12.9			Average Ratio: 14.8	

TABLE A-4 (cont'd)
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Borderland Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-03	294	5.3	0.6	8.8
ID-03	749	37.6	1.5	25.1
ID-03	948	41.2	1.5	27.5
ID-03	1022	5.3	0.3	17.7
ID-03	1104	6.5	1.7	3.8
ID-03	1261	16.4	2.0	8.2
ID-03	1263	10.7	1.3	8.2
Sub-total:	7	123.0	8.9	99.3
Ratio of Averages: 13.8			Average Ratio: 14.2	
ID-04	710	37.1	1.1	33.7
ID-04	739	25.3	1.1	23.0
ID-04	741	44.2	1.3	34.0
ID-04	942	32.4	0.6	54.0
ID-04	943	37.6	2.2	17.1
ID-04	951	42.0	2.7	15.6
ID-04	953	35.5	3.0	11.8
ID-04	1106	19.9	2.6	7.7
ID-04	1119	9.2	1.8	5.1
ID-04	1120	8.6	1.9	4.5
ID-04	1122	27.8	2.4	11.6
ID-04	1123	30.1	1.9	15.8
ID-04	1125	23.9	1.7	14.1
ID-04	1126	46.1	0.6	76.8
ID-04	1249	37.9	2.5	15.2
ID-04	1251	39.7	1.8	22.1
ID-04	1254	35.7	2.0	17.9
ID-04	1257	29.7	2.4	12.4
ID-04	1258	6.5	1.8	3.6
ID-04	1267	31.5	3.3	9.5
Sub-total:	20	600.7	38.7	405.5
Ratio of Averages: 15.5			Average Ratio: 20.3	

TABLE A-4 (cont'd)
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Borderland Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1252	50.4	0.7	72.0
ID-06	653	17.8	0.3	59.3
ID-06	757	33.7	0.4	84.3
Sub-total:	2	51.5	0.7	143.6
	Ratio of Averages: 73.6		Average Ratio: 71.8	
ID-07	724	29.0	3.3	8.8
ID-07	756	35.2	1.2	29.3
Sub-total:	2	64.2	4.5	38.1
	Ratio of Averages: 14.3		Average Ratio: 19.1	
TOTAL:	68	1844.8	127.3	1289.8
	Ratio of Averages: 14.5		Average Ratio: 19.0	

TABLE A-5
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Stonehenge Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-01	1022	35.1	0.3	117.0
IE-01	1261	48.2	1.2	40.2
Sub-total:	2	83.3	1.5	157.2
	Ratio of Averages: 55.5		Average Ratio: 78.6	
IE-02	1021	40.6	0.8	50.8
IE-02	1259	20.4	2.0	10.2
IE-02	1269	26.6	1.0	26.6
Sub-total:	3	87.6	3.8	87.6
	Ratio of Averages: 23.1		Average Ratio: 29.2	
IE-03	823	31.5	0.3	105.0
IE-03	938	36.7	2.1	17.5
IE-03	939	39.9	2.8	14.3
IE-03	940	11.4	0.3	38.0
IE-03	941	15.2	2.3	6.6
IE-03	1105	17.1	0.4	42.8
IE-03	1120	28.2	1.5	18.8
IE-03	1121	5.9	1.3	4.5
IE-03	1122	43.4	1.3	33.4
IE-03	1123	48.2	1.9	25.4
IE-03	1124	8.9	1.8	4.9
IE-03	1125	46.4	2.0	23.2
IE-03	1127	12.9	2.3	5.6
IE-03	1128	19.2	2.3	8.3
IE-03	1129	12.3	0.3	41.0
IE-03	1253	26.9	0.6	44.8
IE-03	1258	39.0	2.6	15.0
IE-03	1267	42.4	0.7	60.6
Sub-total:	18	485.5	26.8	509.7
	Ratio of Averages: 18.1		Average Ratio: 28.3	
IE-04	653	37.5	2.1	17.9
TOTAL:	24	693.9	34.2	772.4
	Ratio of Averages: 20.3		Average Ratio: 32.2	

TABLE A-6
WASTE/COAL THICKNESS RATIOS
Wood Mountain Coalfield

Killdeer Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-01	1259	32.4	0.8	40.5
IF-01	1260	45.2	0.7	64.6
Sub-total:	2	77.6	1.5	105.1
	Ratio of Averages: 51.7		Average Ratio: 52.6	
IF-02	1130	14.1	0.7	20.1
IF-03	940	26.0	0.8	32.5
IF-03	941	25.9	0.3	86.3
IF-03	1105	39.2	0.7	56.0
IF-03	1127	29.0	1.4	20.7
IF-03	1128	43.7	1.4	31.2
IF-03	1129	30.3	0.9	33.7
IF-03	1253	41.8	0.4	104.5
Sub-total:	7	235.9	5.9	364.9
	Ratio of Averages: 40.0		Average Ratio: 52.1	
IF-04	931	7.4	0.9	8.2
IF-05	1119	41.3	2.4	17.2
IF-05	1120	44.2	3.5	12.6
IF-05	1121	23.0	1.5	15.3
IF-05	1124	22.0	0.6	36.7
Sub-total:	4	130.5	8.0	81.8
	Ratio of Averages: 16.3		Average Ratio: 20.5	
IF-06	292	15.0	0.3	50.0
IF-07	822	10.7	0.3	35.7
IF-08	291	12.6	0.6	21.0
IF-08	293	48.8	1.8	27.1
Sub-total:	2	61.4	2.4	48.1
	Ratio of Averages: 25.6		Average Ratio: 24.1	
TOTAL:	19	552.6	20.0	713.9
	Ratio of Averages: 27.6		Average Ratio: 37.6	

APPENDIX 2

EVALUATION CRITERIA

The following evaluation criteria were used in the estimation of the recoverable coal in the Southern Saskatchewan Coalfields:

Mining Parameters

Lignite density: 1.24, assuming 39% moisture and 9.5% ash, therefore the density-volume factor is 0.85 . (See derivation on next page.)

Zone of Influence around an individual drill hole (It is a square area whose sides are the following distances from the drill hole in it's center):

Measured category: < 0.4 km

Indicated category: < 0.8 km

Inferred category: > 0.8 < 1.6 km

Maximum allowable mining depth : 50 metres

Recoverable Coal Thickness Restrictions

Minimum thickness of a single seam: 150 centimetres

Minimum thickness of a mineable seam : 45.7 centimetres (with a loss of 22.8 centimetres on the top and 7.6 centimetres on the bottom).

Parting:

-cannot exceed a stripping ratio of 2:1 with respect to a coal seam beneath it.

-partings of 7.6 centimetres or more are to be removed separately from the underlying coal.

Non-mineable Area Definitions

Allowance of 30 metres is made to the crest of river valleys and to the back of underground mines or pits.

Allowances of 100 metres from centreline of railroads and centreline of 230 and 138 kV power lines.

Areas within town and airport limits.

Note: The second and the third of these three definitions were not enforced in the present assessment.

DERIVATION OF THE DENSITY-VOLUME FACTOR

At the time of the preparation of this report there was no definite information available about the density (specific gravity) of the lignite, or it's ash content, in the Wood Mountain Coalfield of Saskatchewan.

The evaluation of **in situ** coal resources of Southern Saskatchewan, (ref.2), used 1.24 g/cm^3 as specific gravity, or unit weight/unit volume, specifying it as an **in situ** figure. The report also stated that *"... at the present time coal quantity details which would permit the creation of a grid of specific values are not available. Therefore a low value for specific gravity has been utilized, resulting in a conservative estimate of coal tonnages present."*

In it's first evaluation of **recoverable** coal reserves of a Southern Saskatchewan Coalfield, (ref.6), the Ore Reserves Assessment Group of CANMET used the 1.24 specific gravity figure. When the results of this assessment were discussed with members of the staff of the Saskatchewan Power Authority, they pointed out that this figure is an **in situ** factor which should not be used to calculate **recoverable** lignite tonnages.

Subsequently the Saskatchewan Power Authority specified in writing the values for the **in situ** specific gravity, as well as percentages for moisture and ash content for the Estevan and the Willow Bunch Coalfield for ORAG, but sent no such data for the Wood Mountain Coalfield. According to the specified data more than 30 percent of the volumes of the first two coalfields are occupied **in situ** by water. The rest of the volumes consist of solid material, composed of lignite and ash. The percentages of the ash were defined in both cases but its composition or specific gravity were not. Therefore only the average specific gravity of the solids **in situ** is calculable from the data.

Not having any specified data for the Wood Mountain Coalfield in the present evaluation, ORAG utilized the information in it's possession which was geographically closest to it, namely the Willow Bunch data, to calculate the **recoverable** tonnage of solid material, i.e., lignite and ash. According to this data 39 percent of the volume of the coalfield is occupied by moisture, i.e. water, in **situ**. The overall average **in situ** specific gravity is 1.24. Therefore to calculate the **in situ** specific gravity of the solid material one must deduct from the overall average weight of the unit volume the weight of the volume percentage occupied by water, whose defined specific gravity is 1.0.

$$(1.0 \times 1.24) - (0.39 \times 1.0) = 0.85$$

This weight of the solid material in the unit volume, divided by the percentage of the unit volume which is occupied by solids, will give the average specific gravity of the latter.

$$0.85 \ / \ 0.61 = 1.39$$

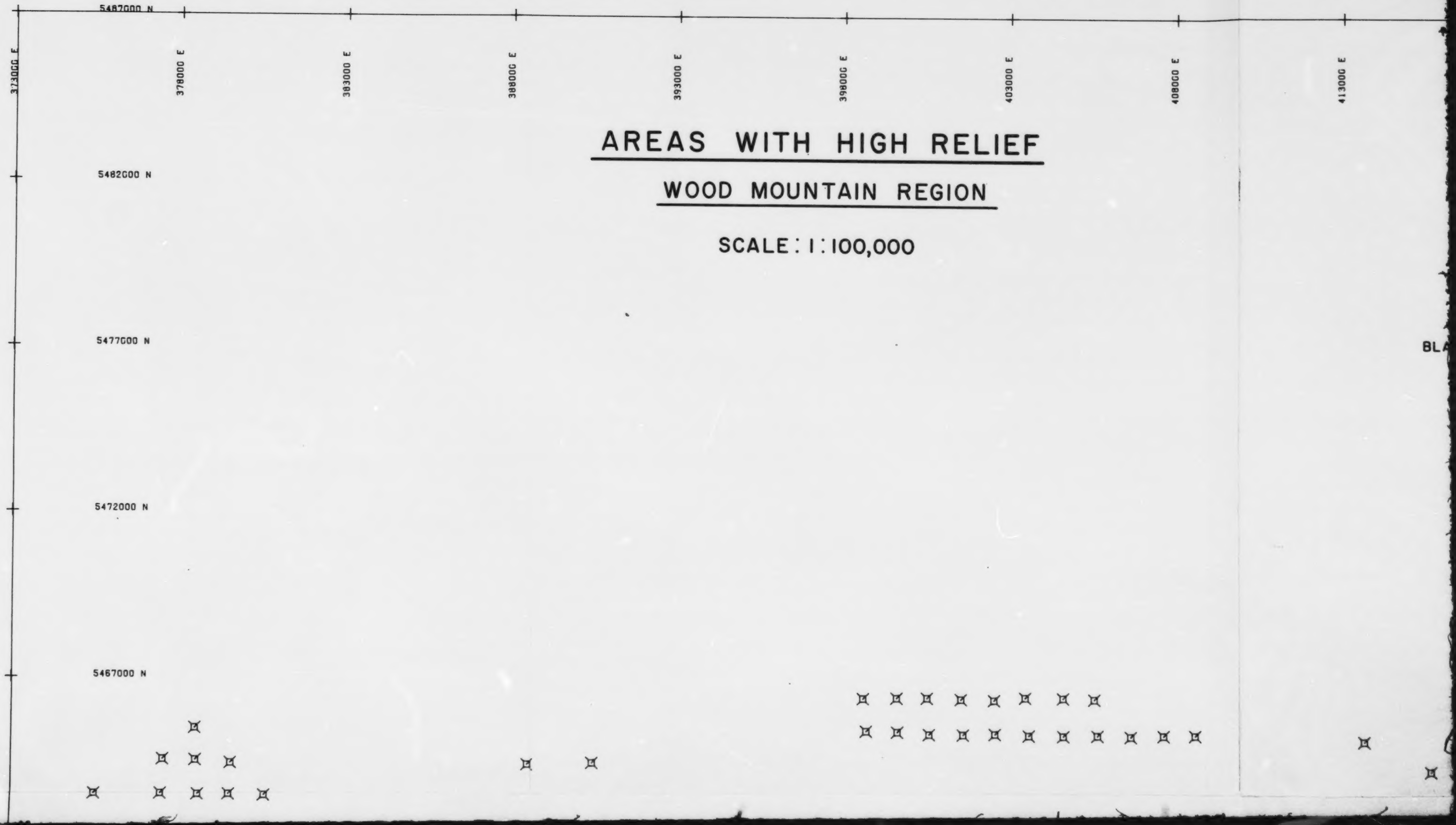
To calculate the weight of the **recoverable** solid material from the Wood Mountain Coalfield, assuming 100 percent mining recovery, one must multiply the horizontal area, underlain by lignite and ashes, with the average mineable thickness. The result of this multiplication, a volume measurement, should be multiplied first with the percentage of solids in the volume to define the volume of the solids in the coalfield. Subsequently the volume of solids should be multiplied by the specific gravity of the solids. The result of this final multiplication will be the weight of the **recoverable** solid material in the coalfield.

For illustrative purposes let's equate the **recoverable** volume of the Wood Mountain Coalfield with unity and then carry out the two multiplications, described in the previous paragraph:

$$[1.0 \times (1.0 - 0.39)] \times 1.39 = 0.85$$

The result of the above illustrated arithmetic operation, **0.85**, is the so called **density-volume factor** with which the actual **in situ** volume of the mineable part of the Wood Mountain Coalfield should be multiplied to derive the weight of **recoverable** solids in it. Naturally it is true only if the recoverability factor is 100 percent.

It is perhaps worthwhile to mention here that the Ore Reserves Assessment Group used the above described procedure to establish the weight of recoverable coal reserves in two previous exercises (ref.7&8).



AREAS WITH HIGH RELIEF

WOOD MOUNTAIN REGION

SCALE: 1:100,000

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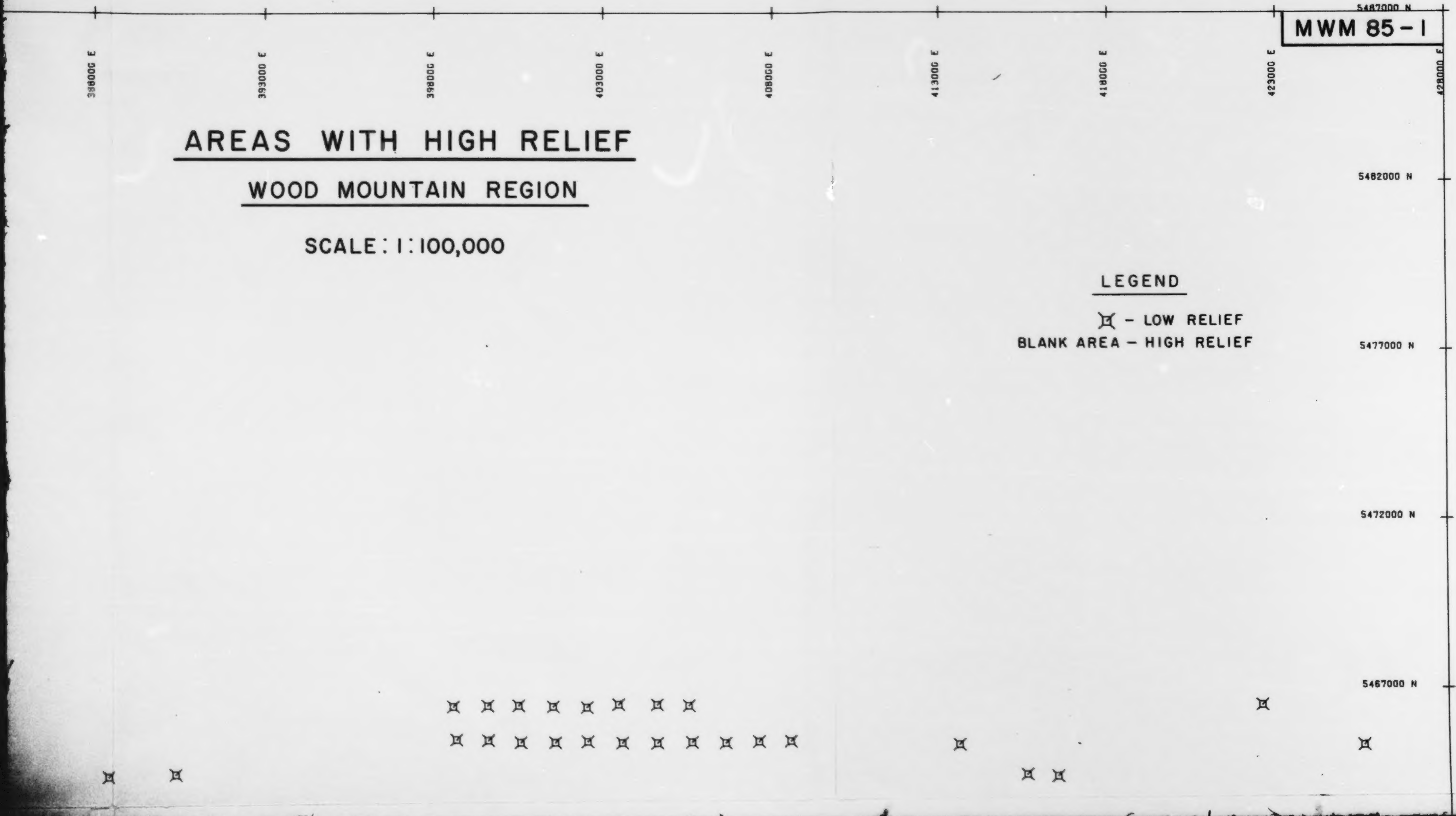

AREAS WITH HIGH RELIEF

WOOD MOUNTAIN REGION

SCALE: 1:100,000

MWM 85-1
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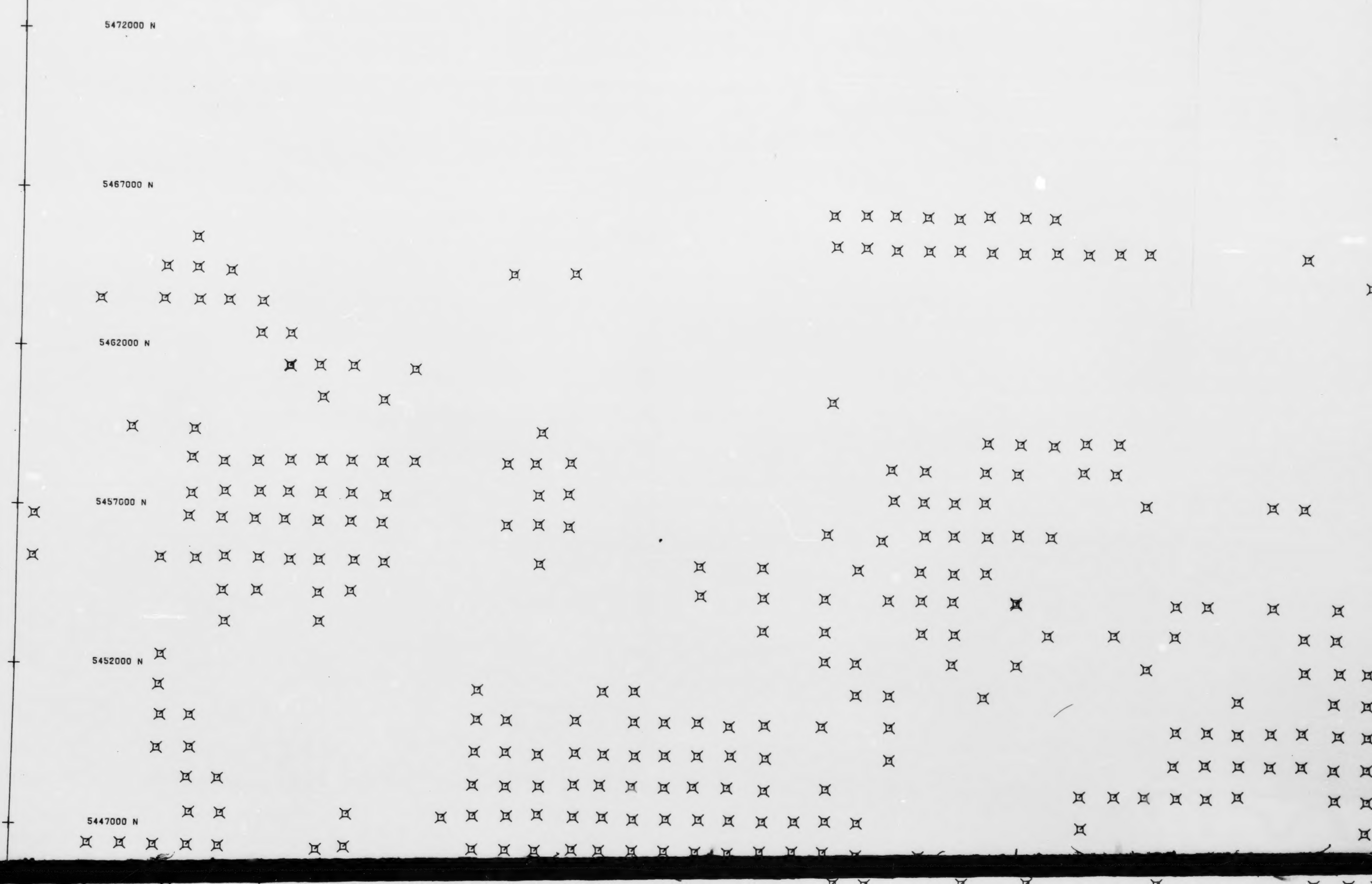
LEGEND
⌑ - LOW RELIEF
BLANK AREA - HIGH RELIEF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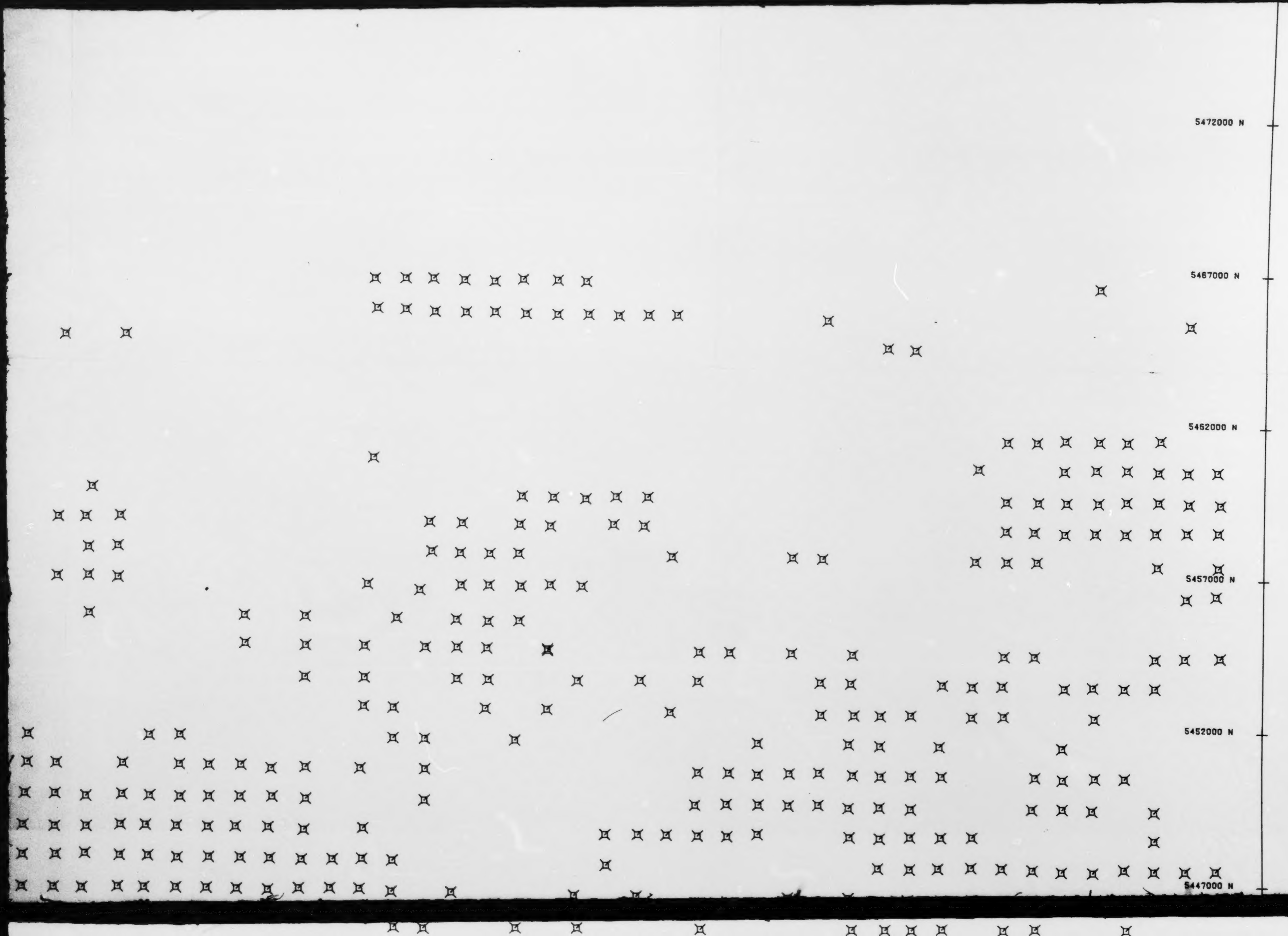
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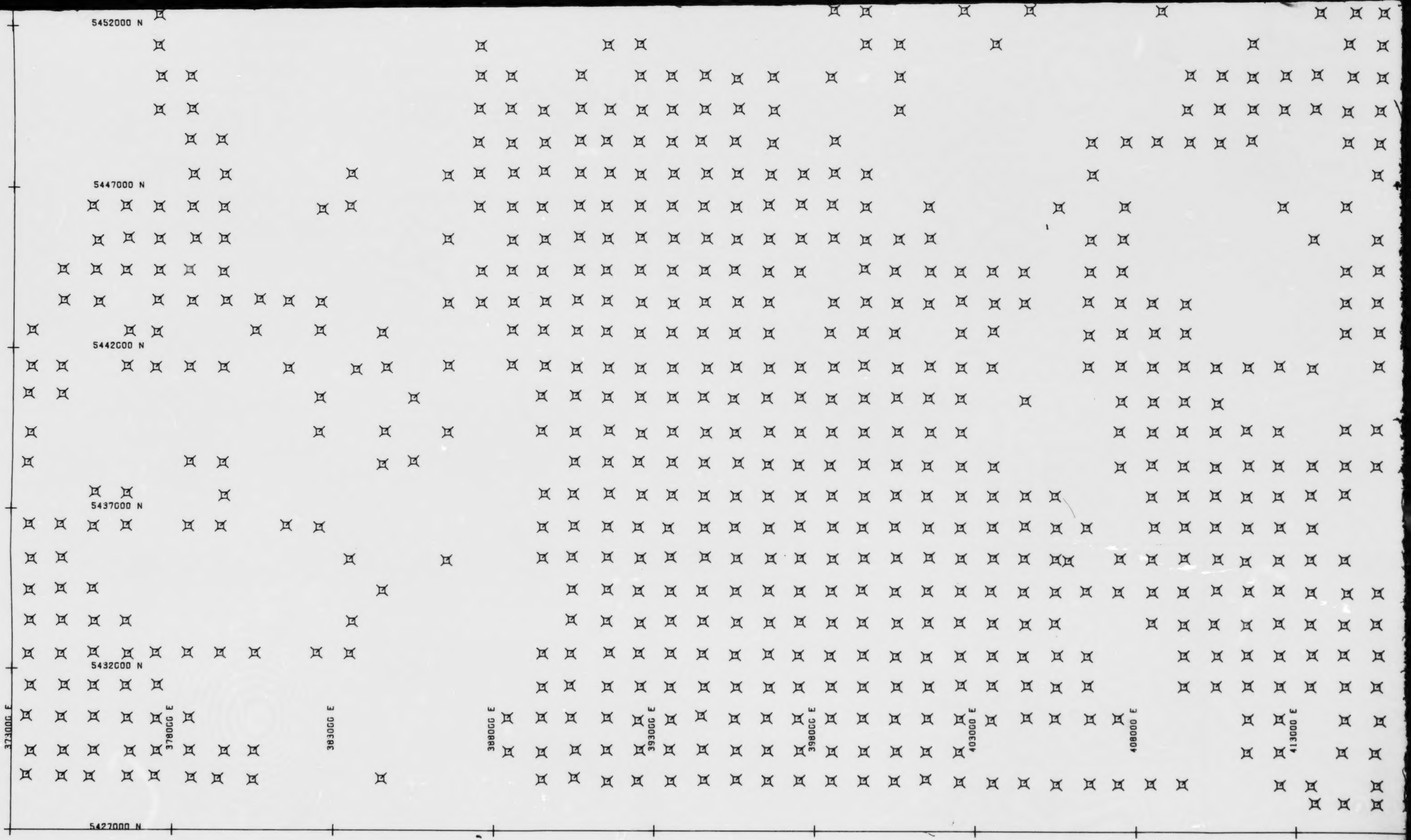
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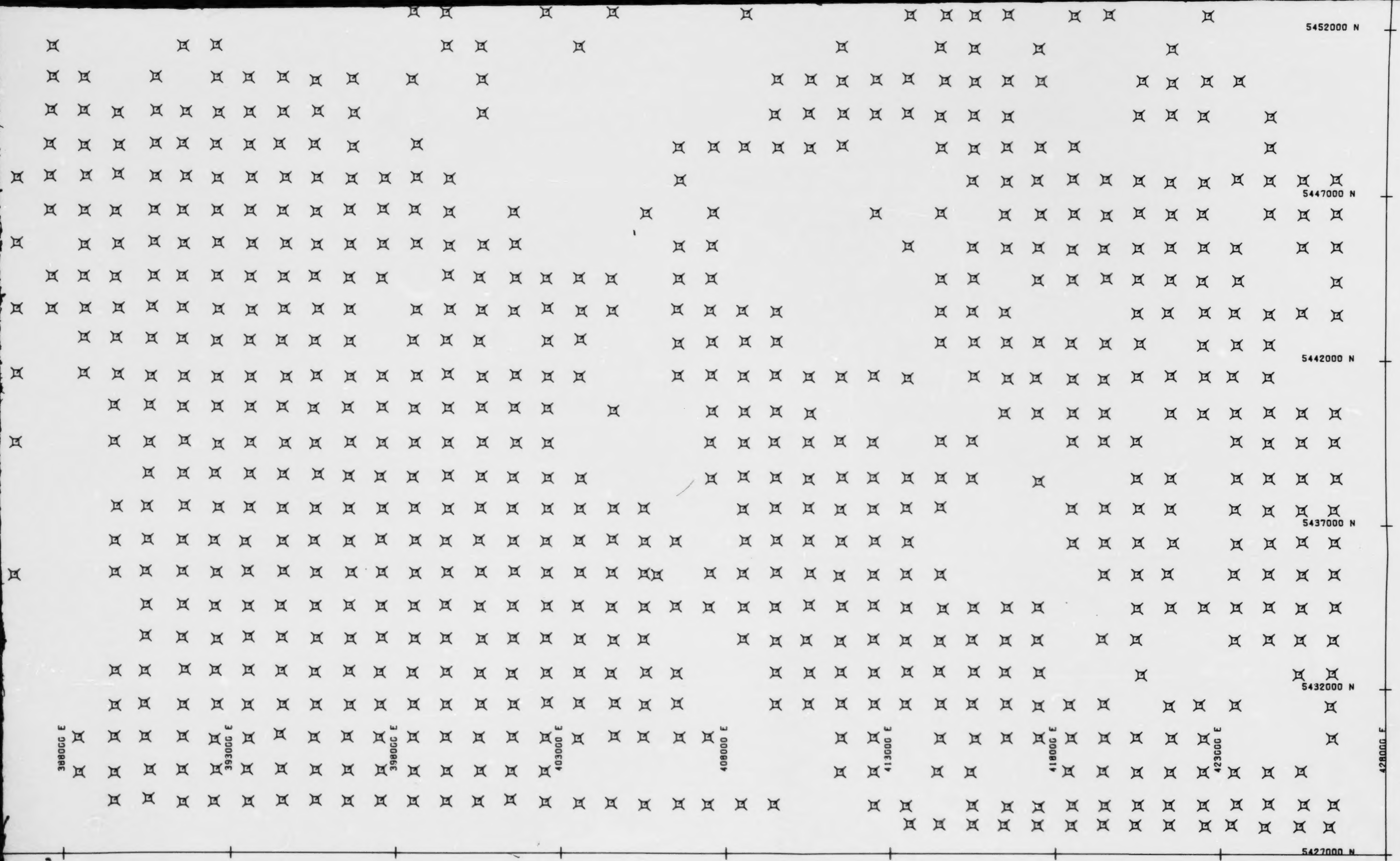
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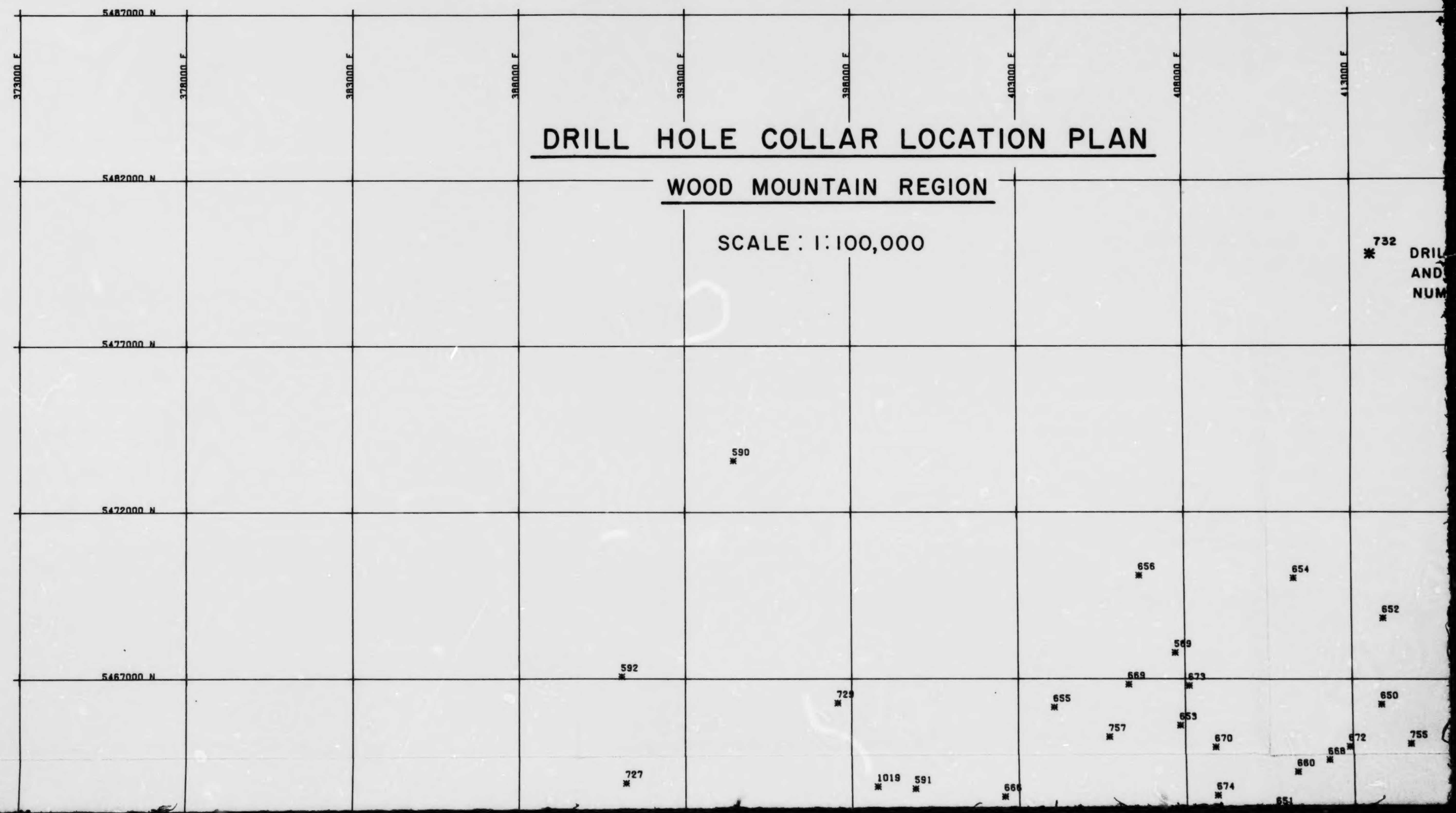

DRILL HOLE COLLAR LOCATION PLAN

WOOD MOUNTAIN REGION

SCALE : 1:100,000

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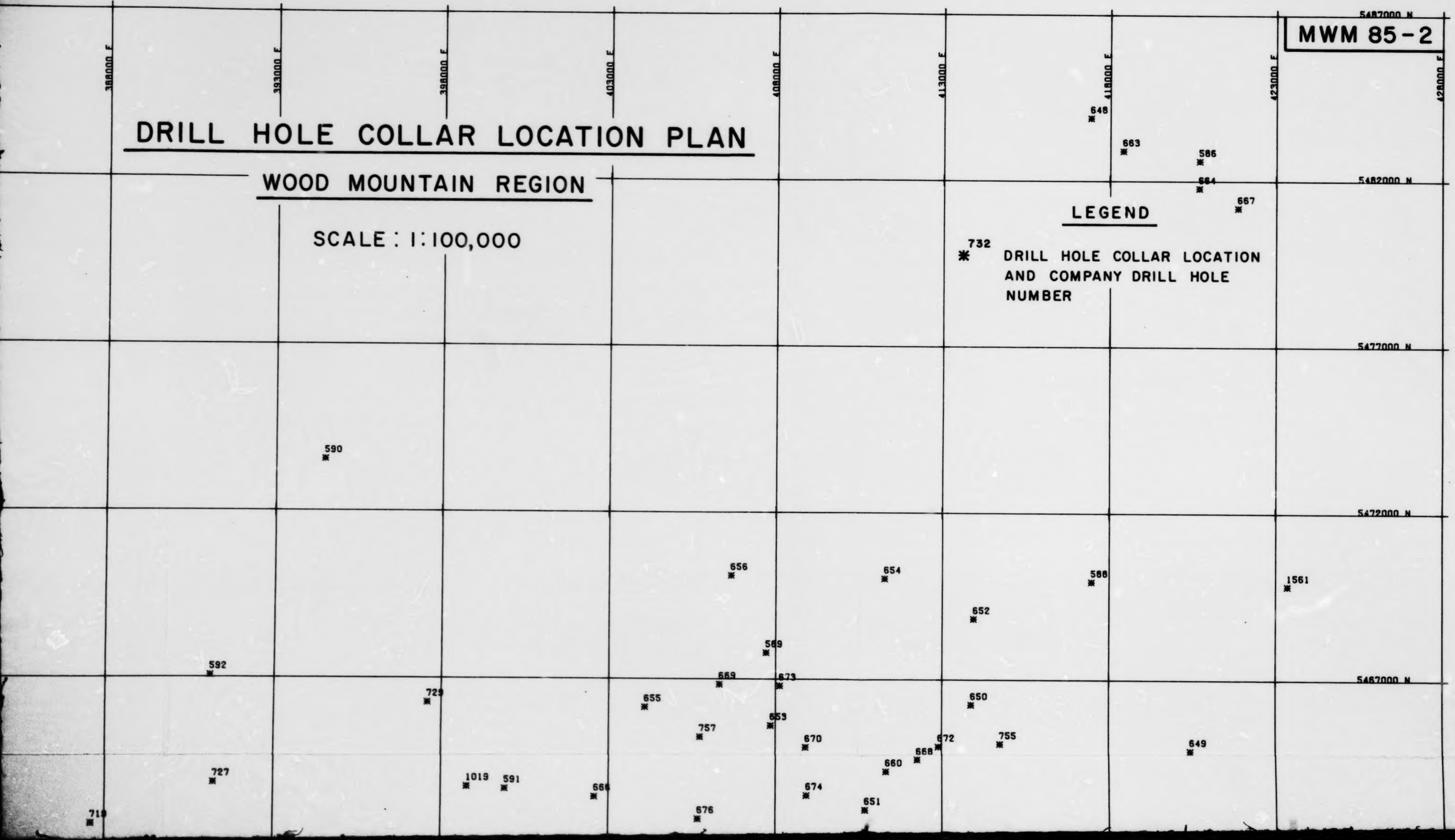
MWM 85-2

DRILL HOLE COLLAR LOCATION PLAN

WOOD MOUNTAIN REGION

SCALE : 1:100,000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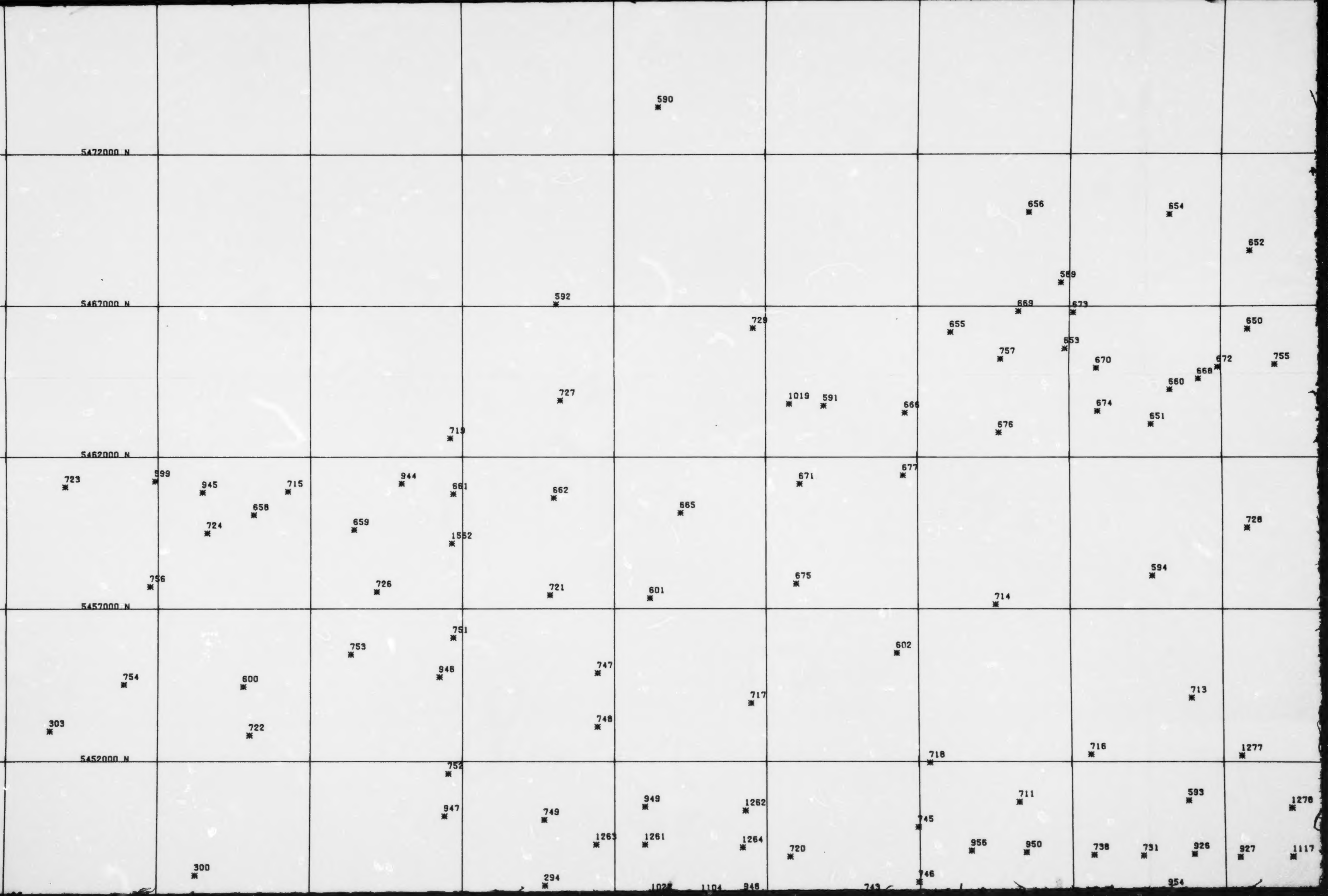
LEGEND

✱ 732 DRILL HOLE COLLAR LOCATION AND COMPANY DRILL HOLE NUMBER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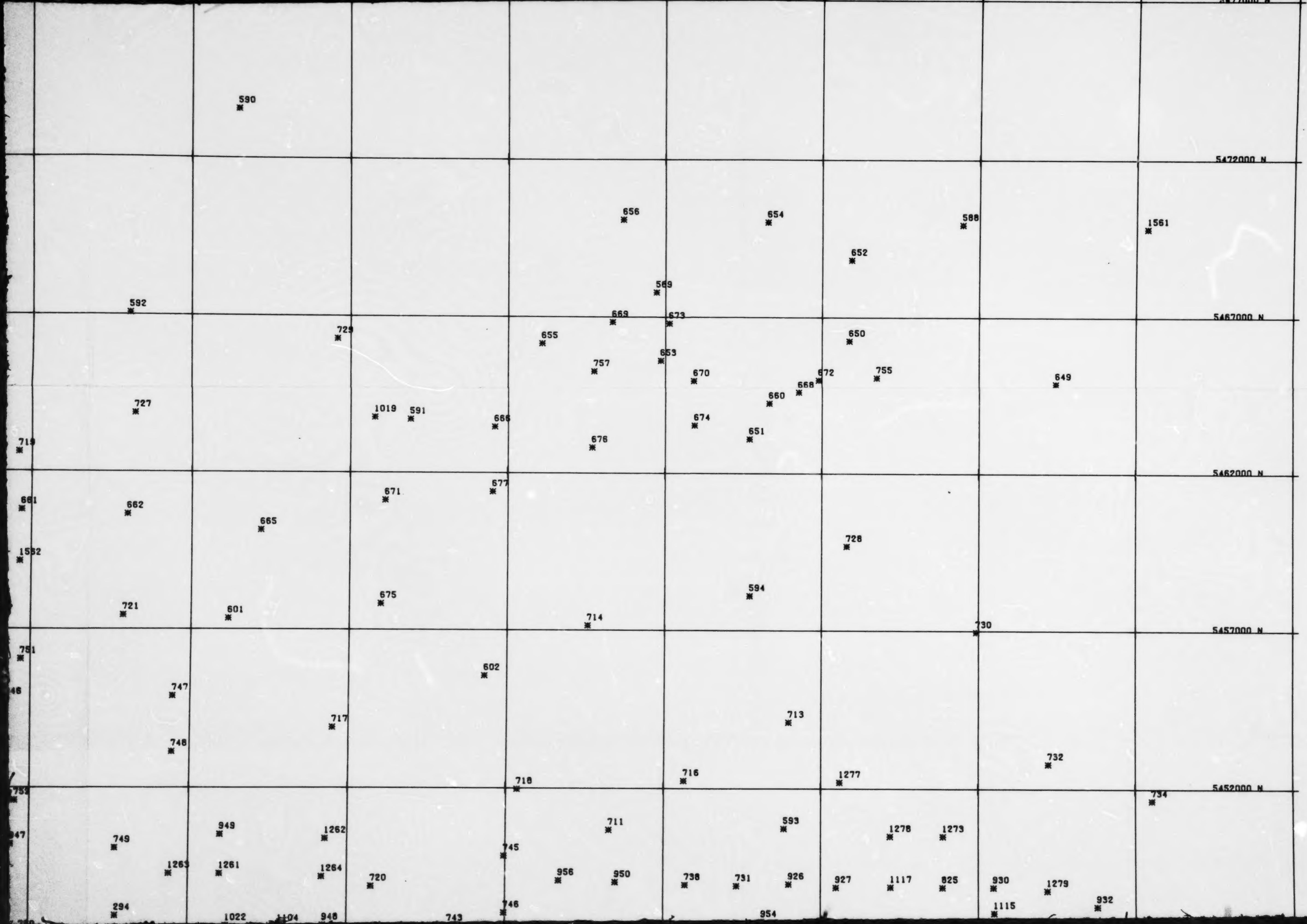
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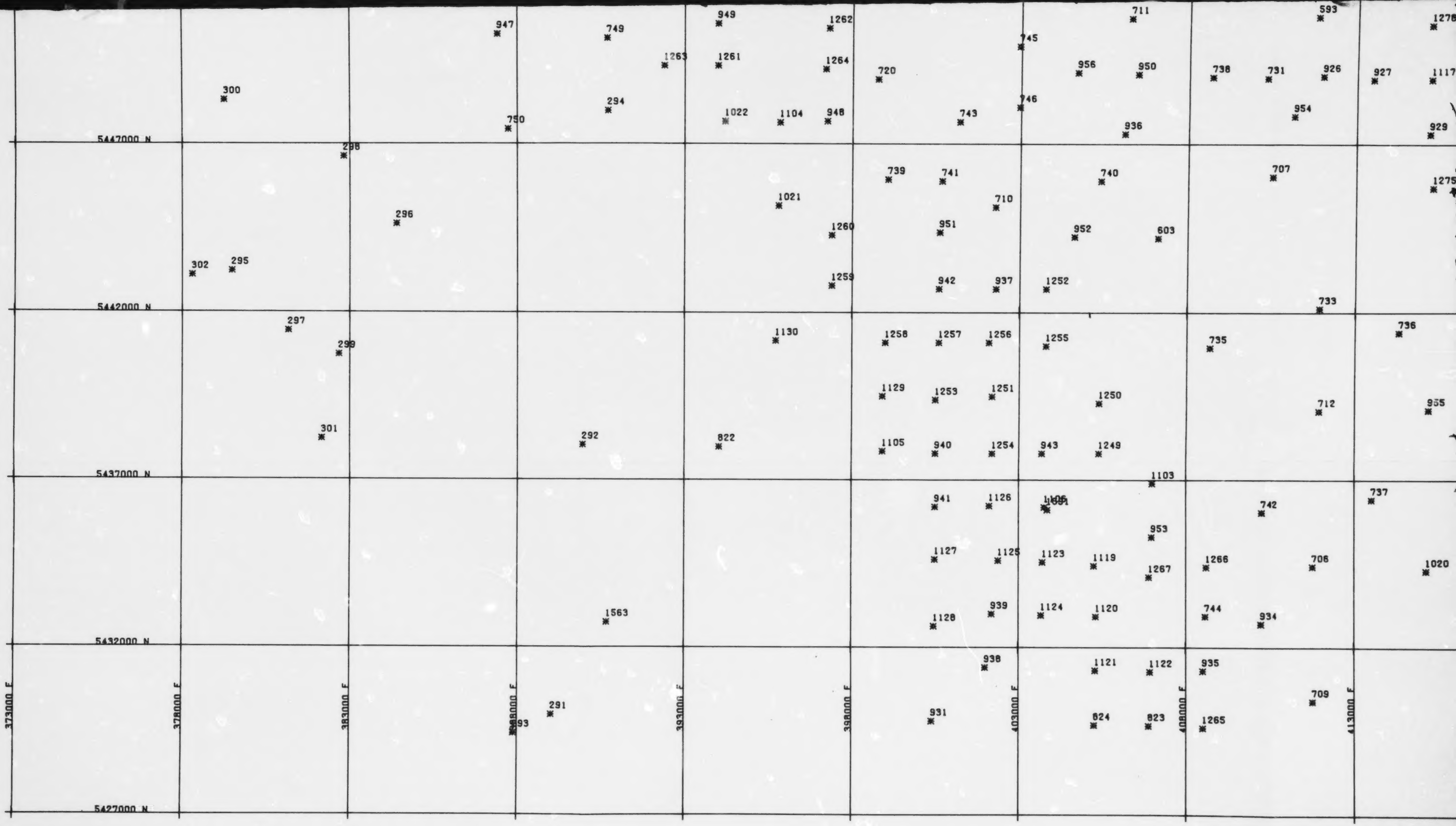
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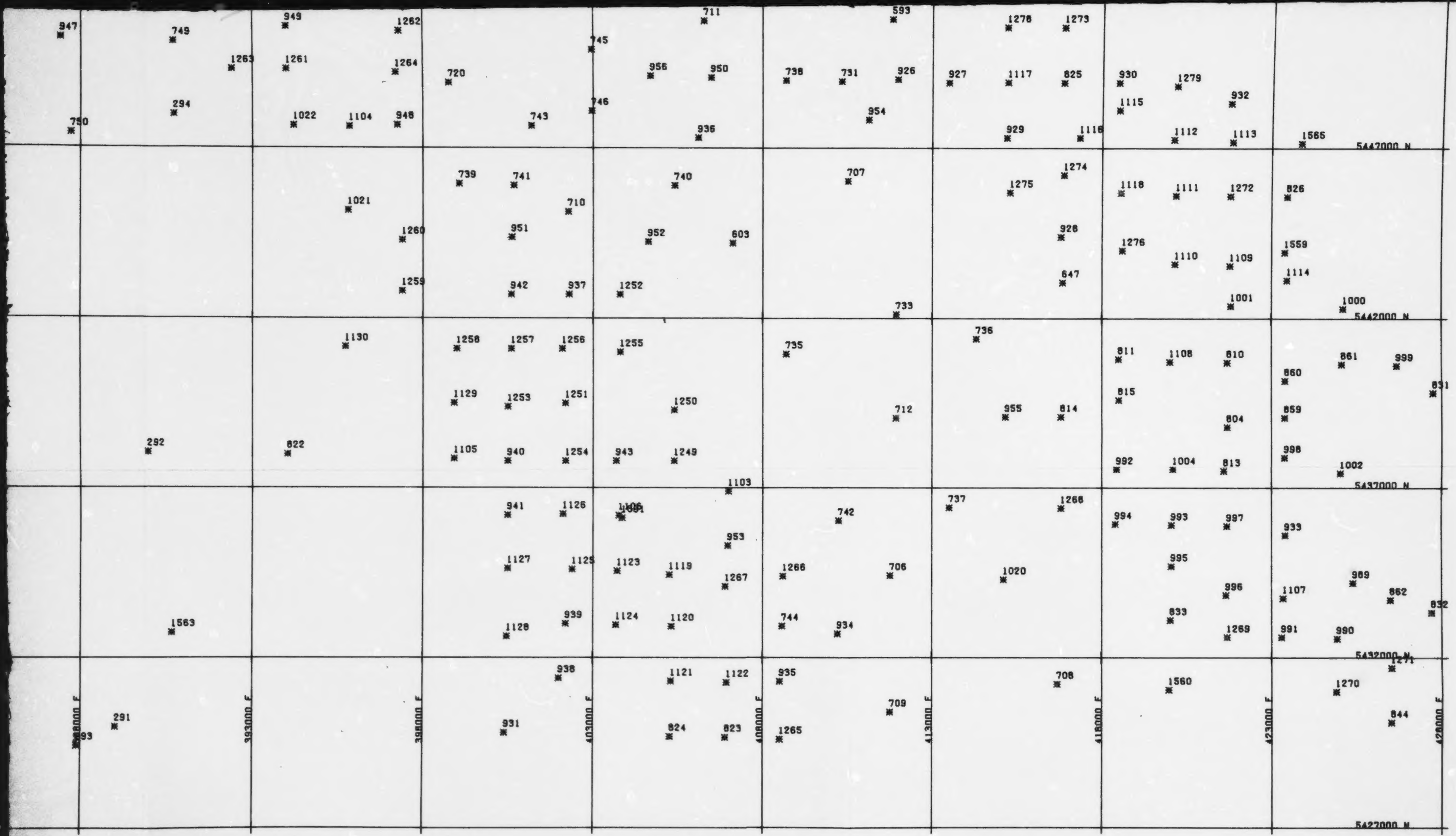
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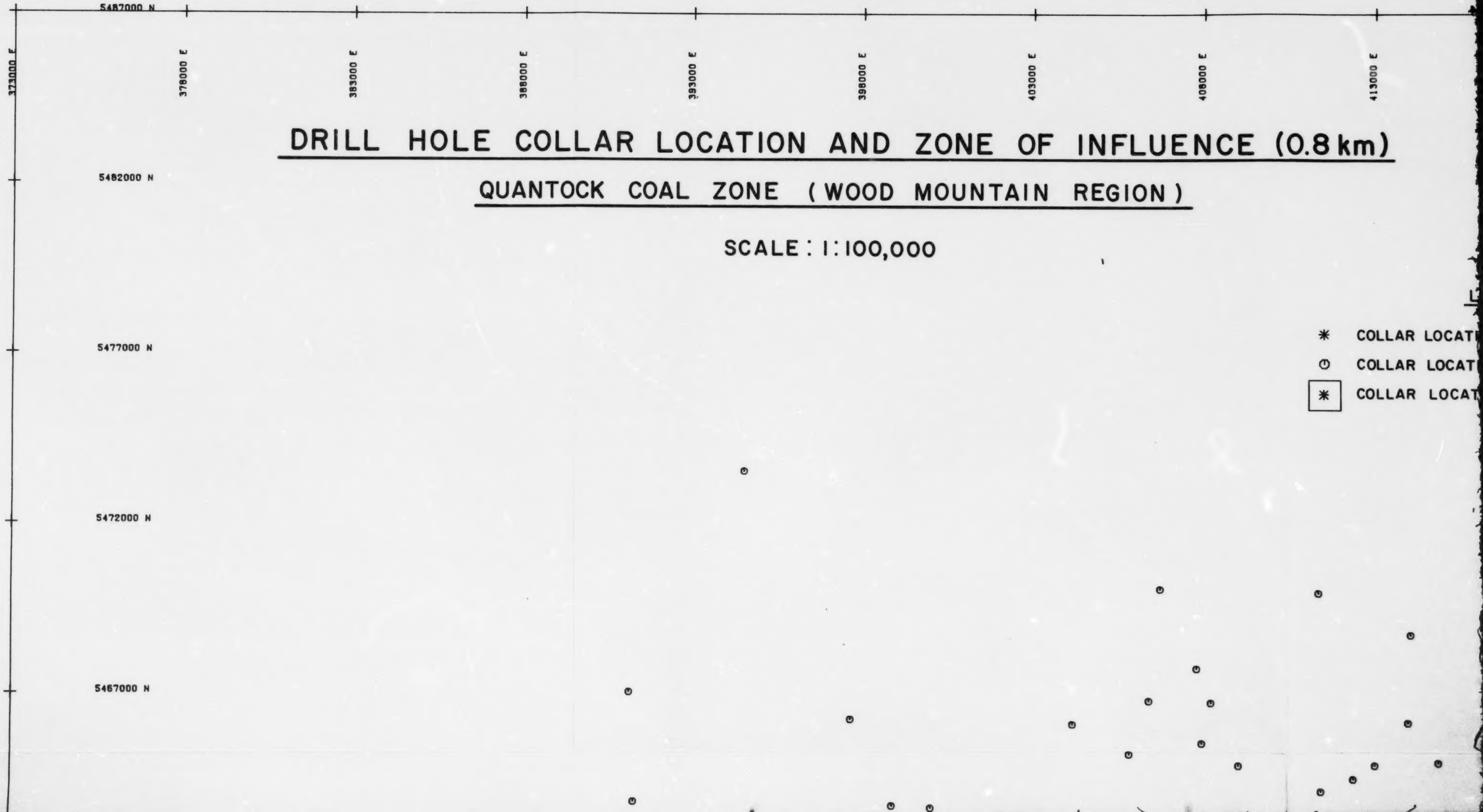

DRILL HOLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1:100,000

5487000 N
5482000 N
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5472000 N
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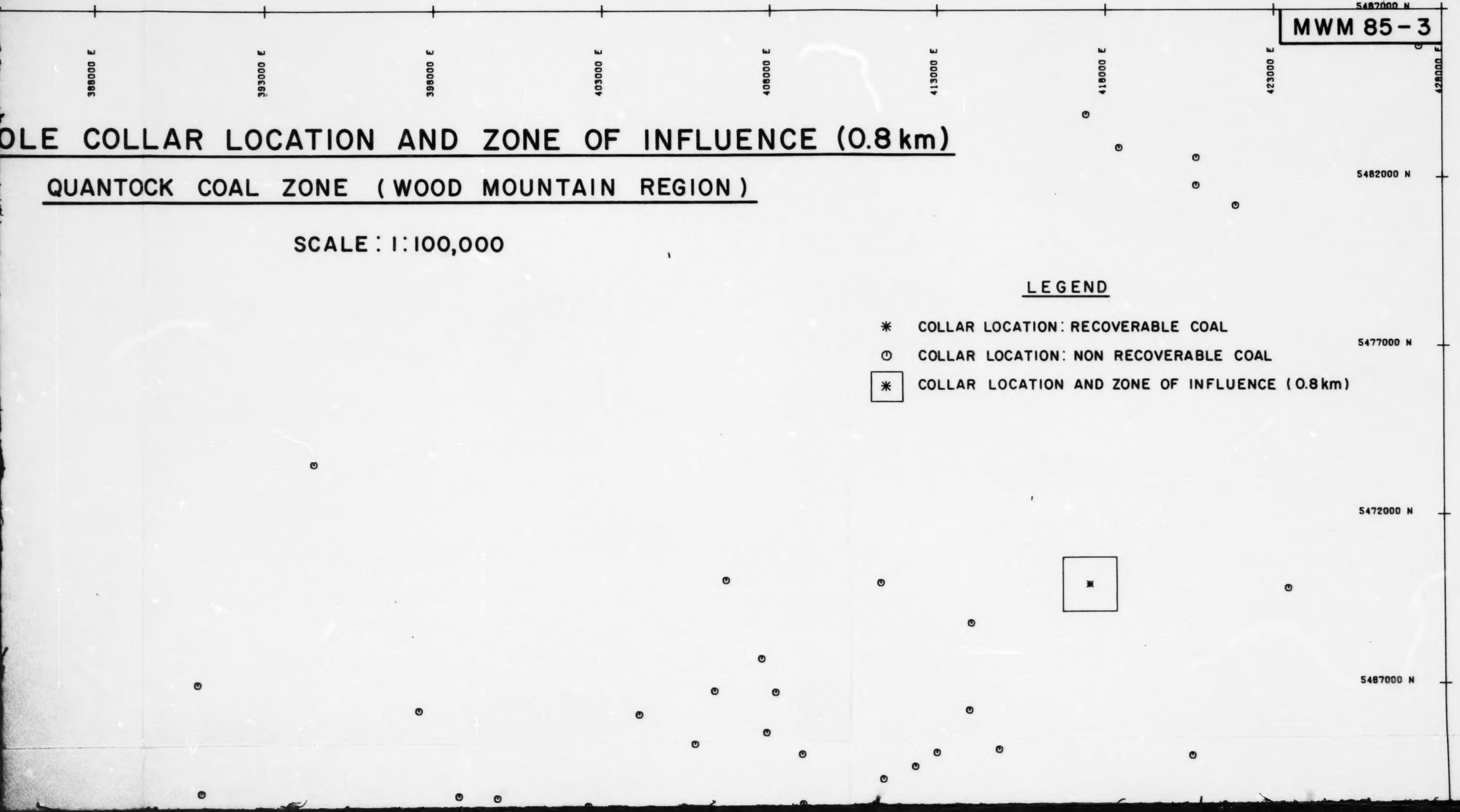
* COLLAR LOCAT

MWM 85-3

OLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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5472000 N
5467000 N

LEGEND

✳ COLLAR LOCATION: RECOVERABLE COAL

○ COLLAR LOCATION: NON RECOVERABLE COAL

⊠ COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

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5472000 N
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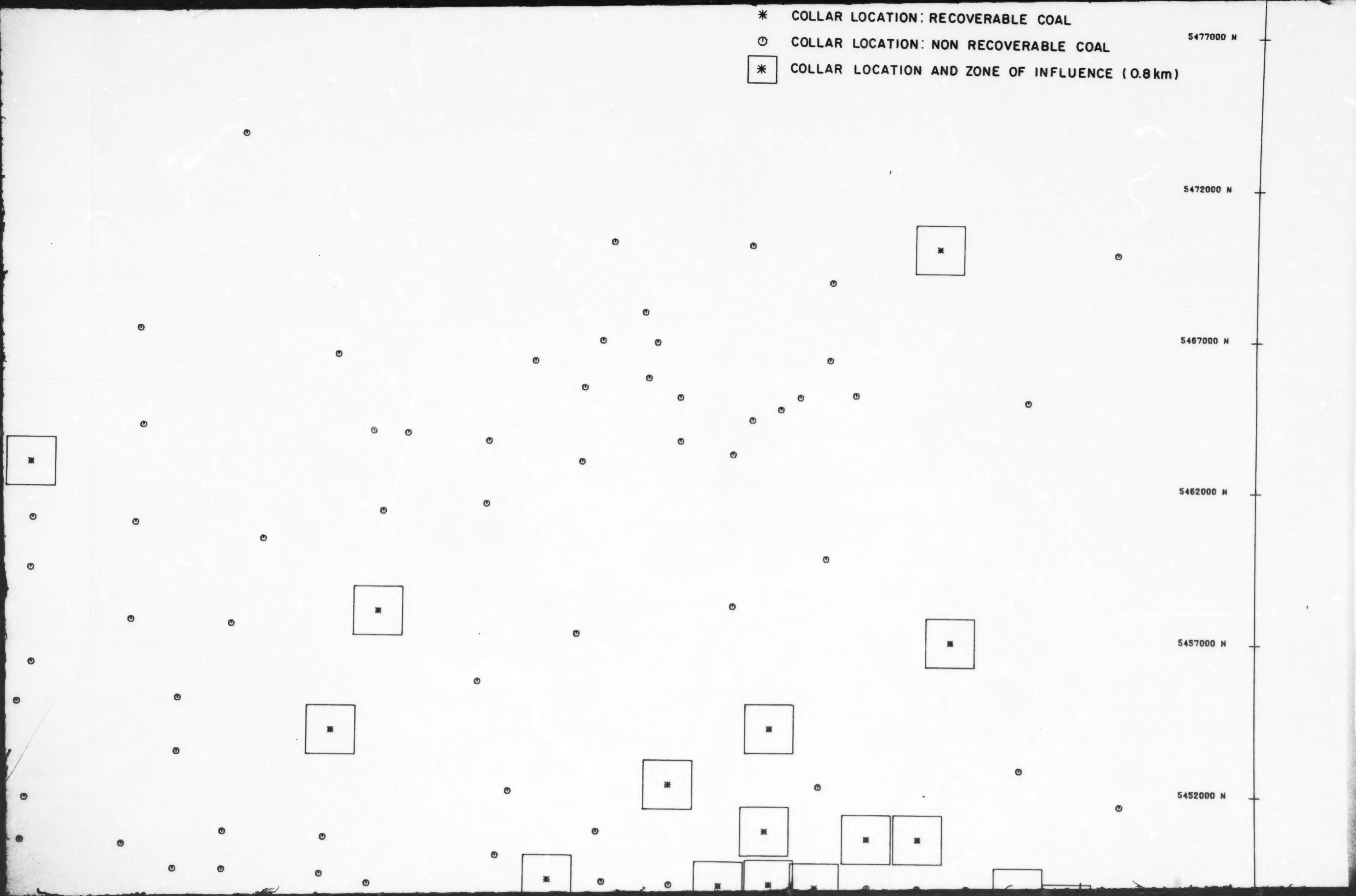
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○ COLLAR LOCATION: NON RECOVERABLE COAL
COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)
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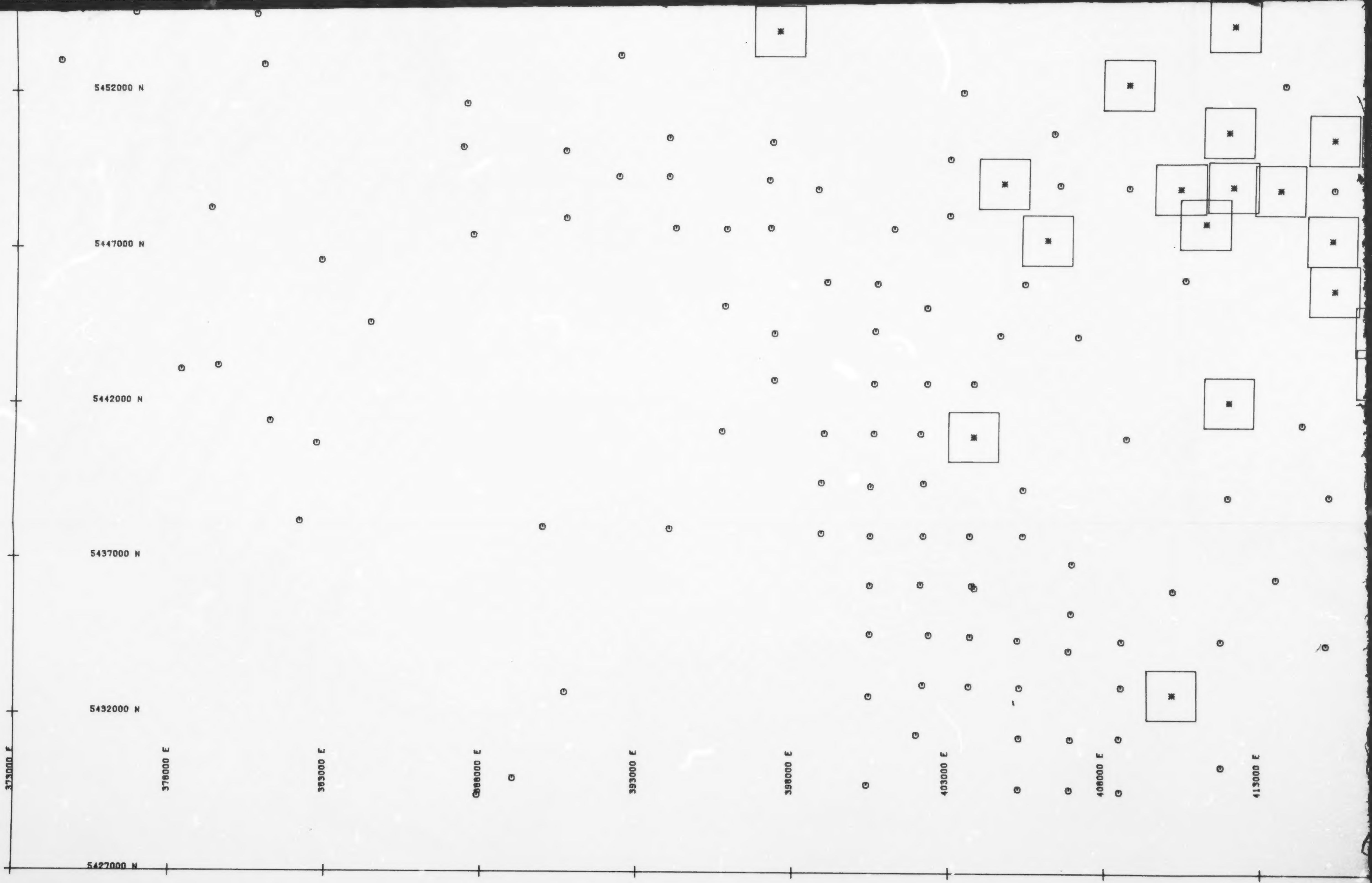
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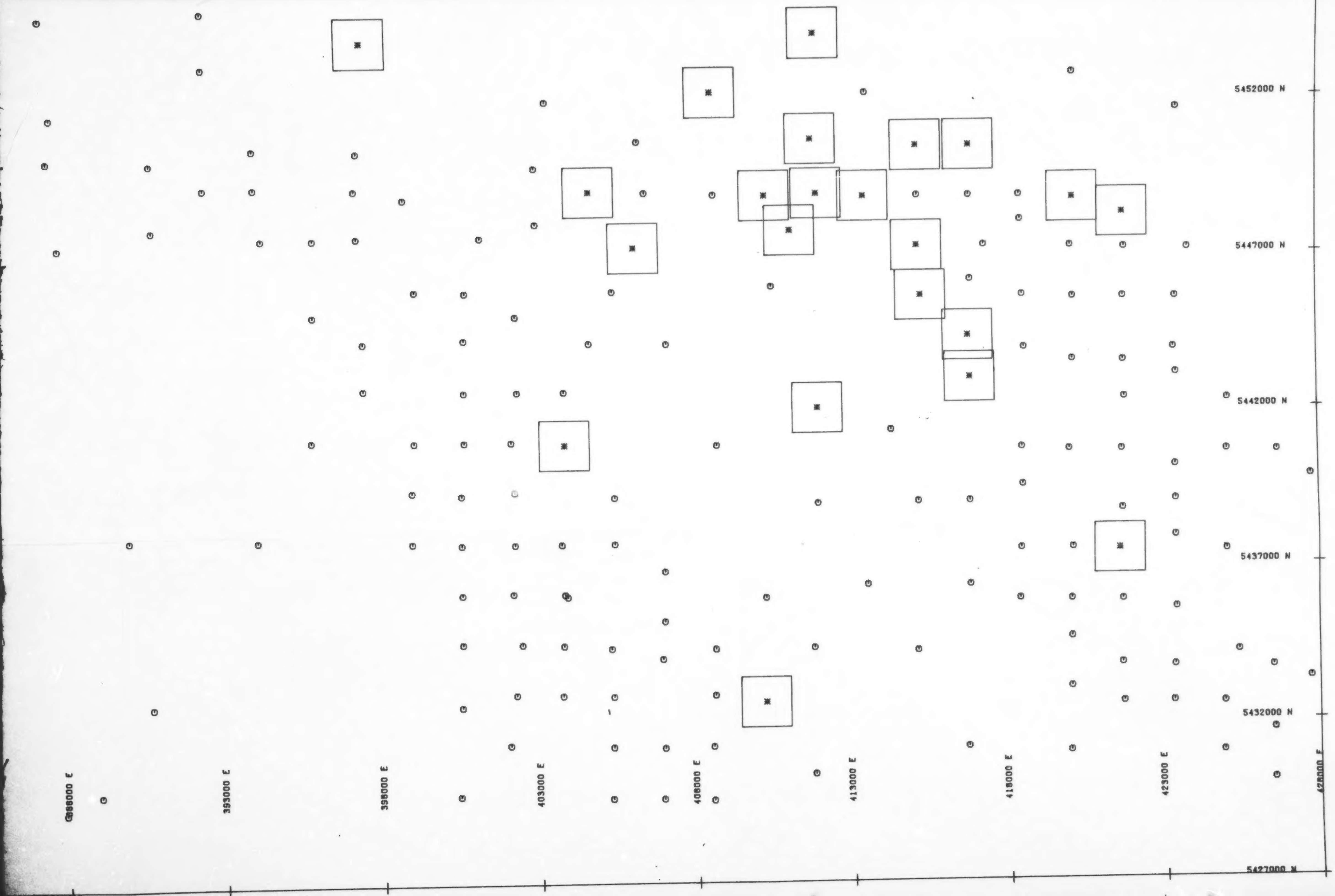
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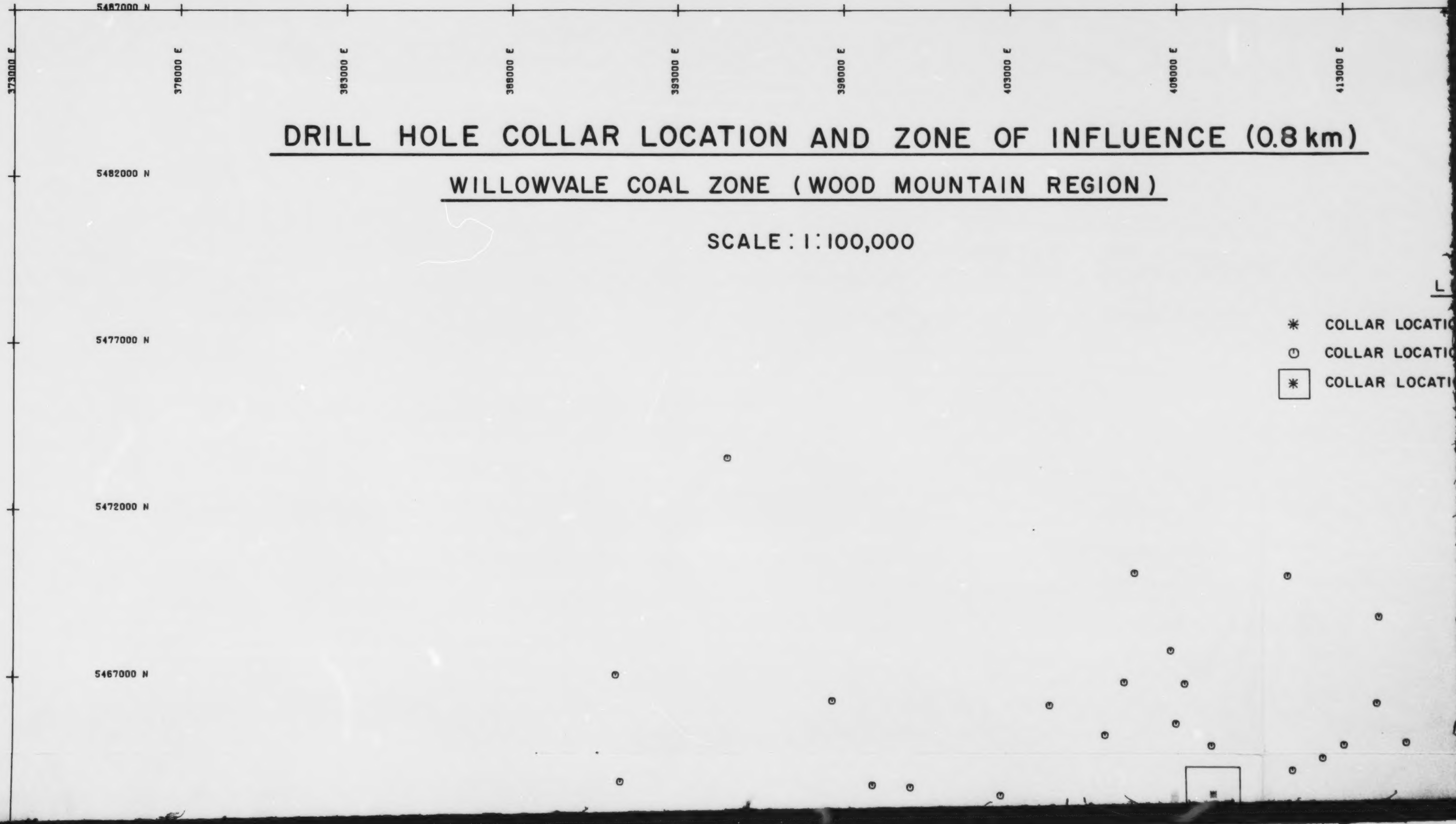
DRILL HOLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1 : 100,000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OLE COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

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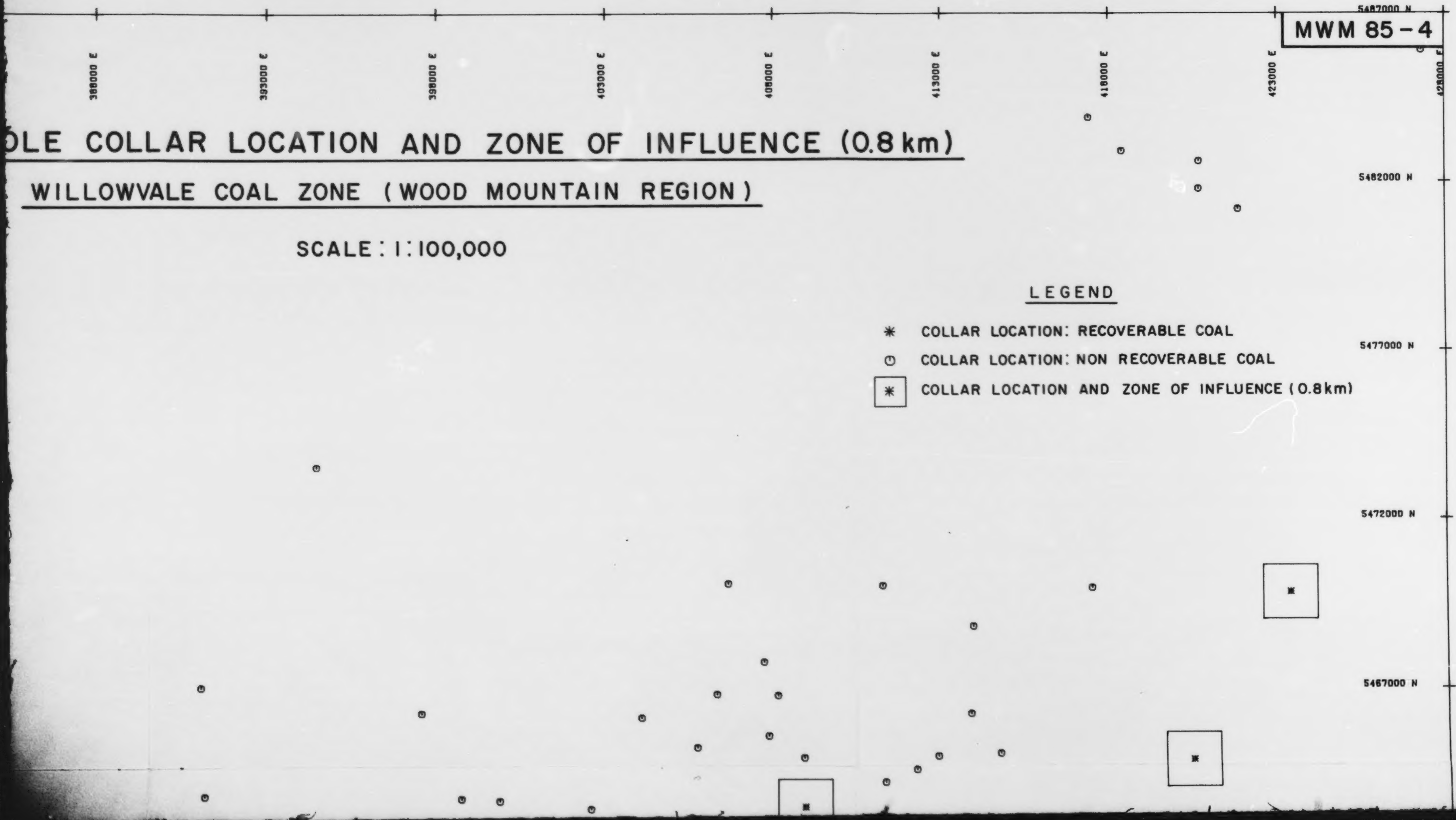
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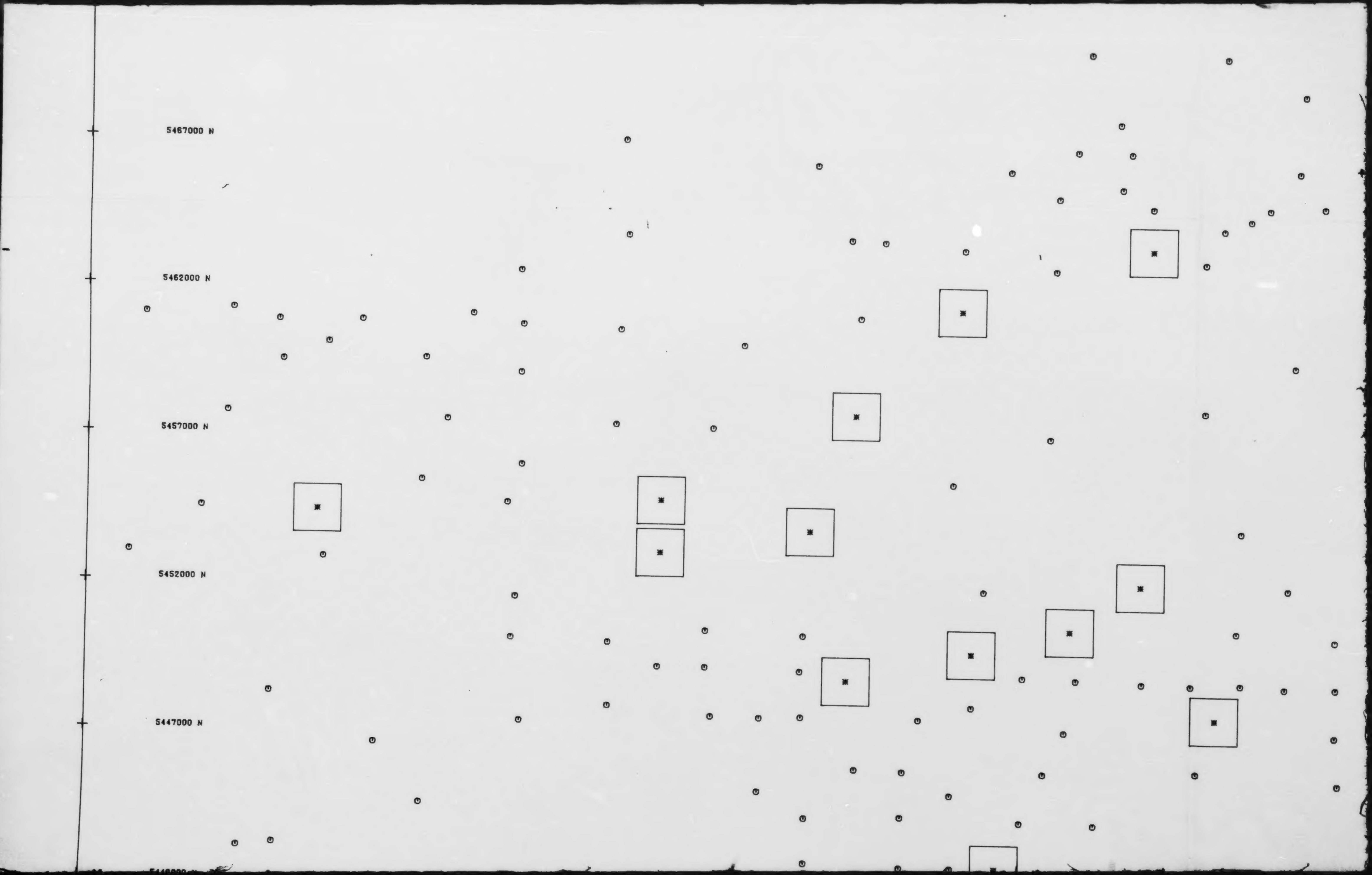
LEGEND
✳ COLLAR LOCATION: RECOVERABLE COAL
○ COLLAR LOCATION: NON RECOVERABLE COAL
☐ COLLAR LOCATION AND ZONE OF INFLUENCE (0.8km)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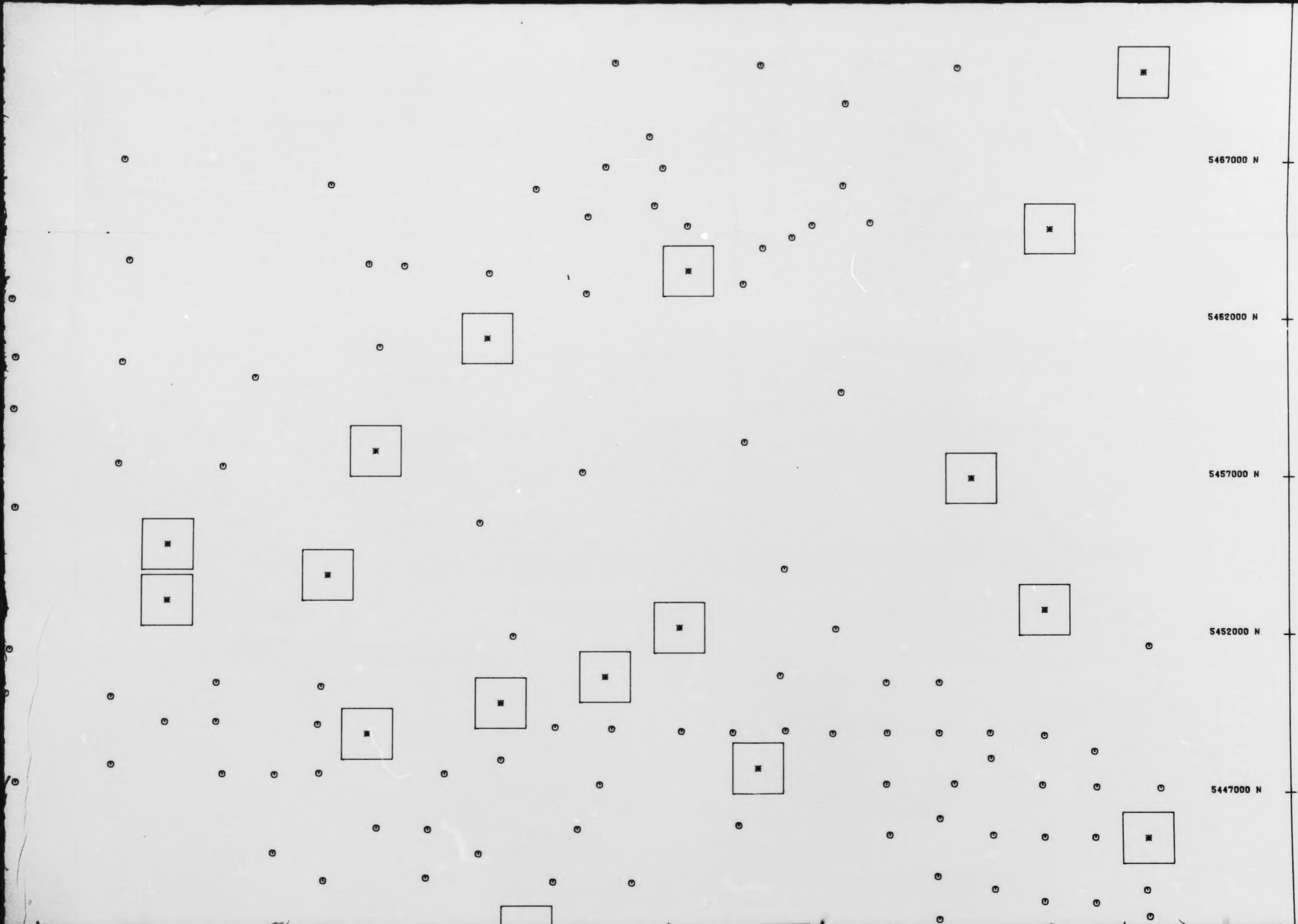
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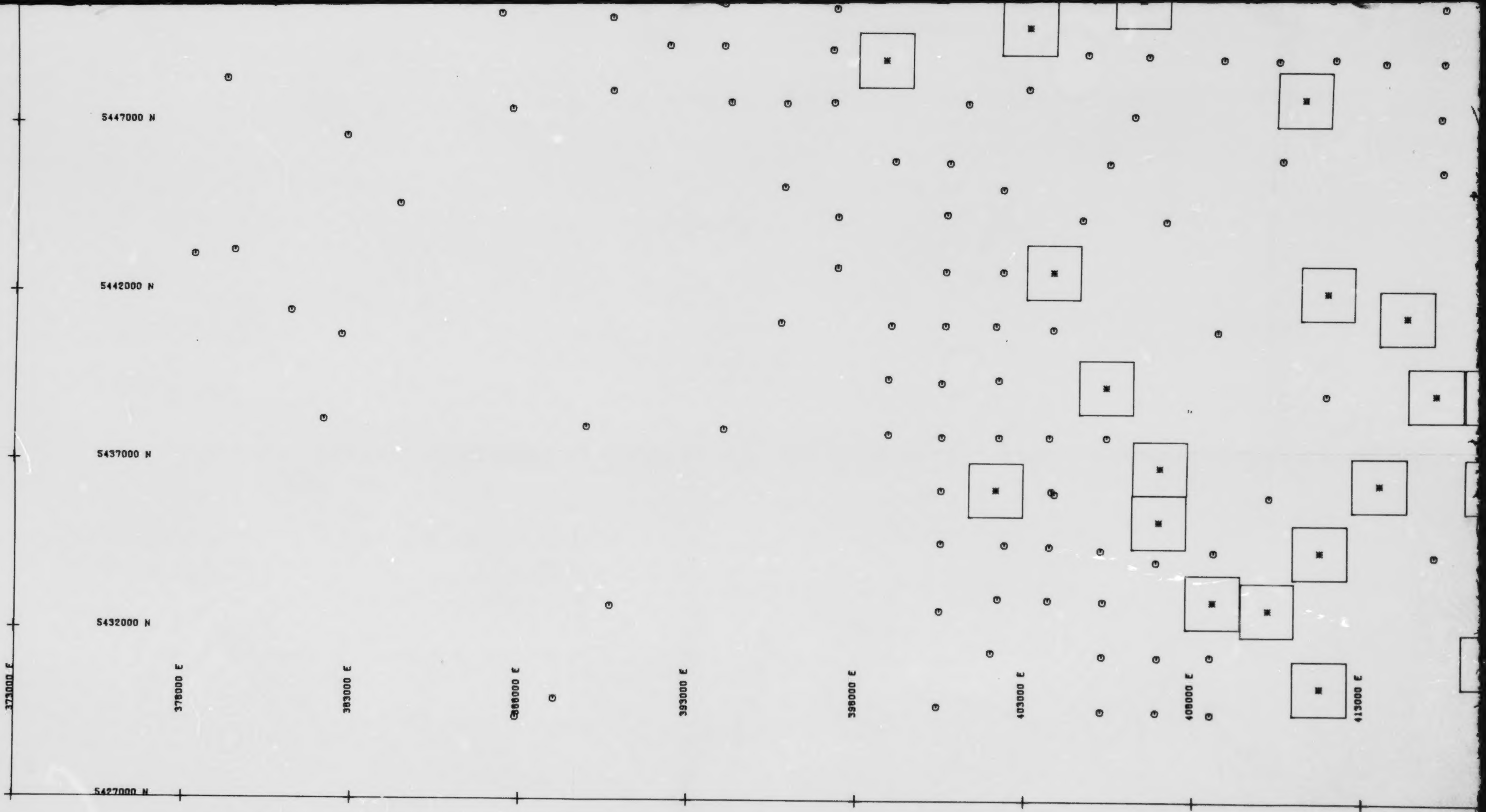
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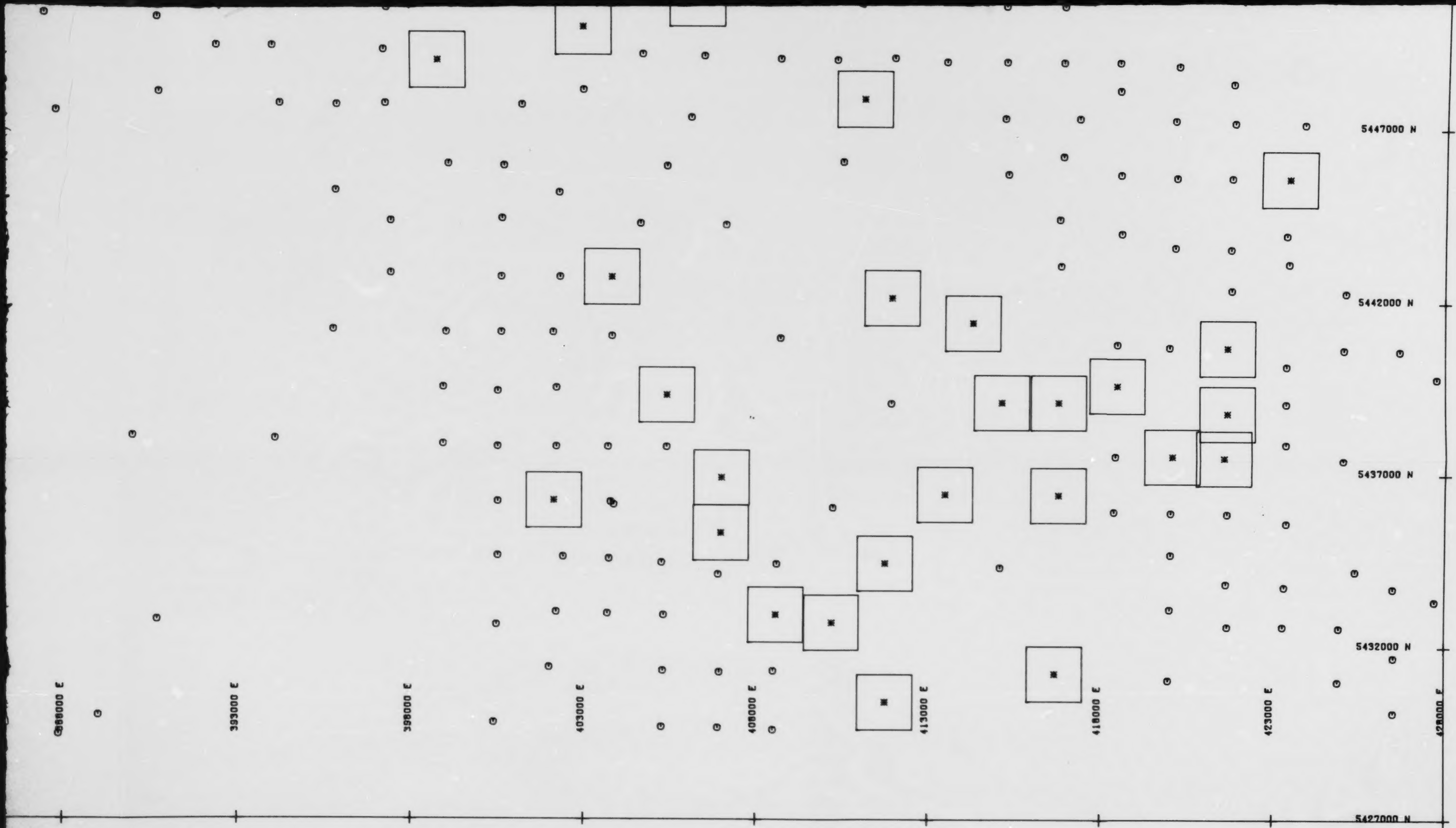
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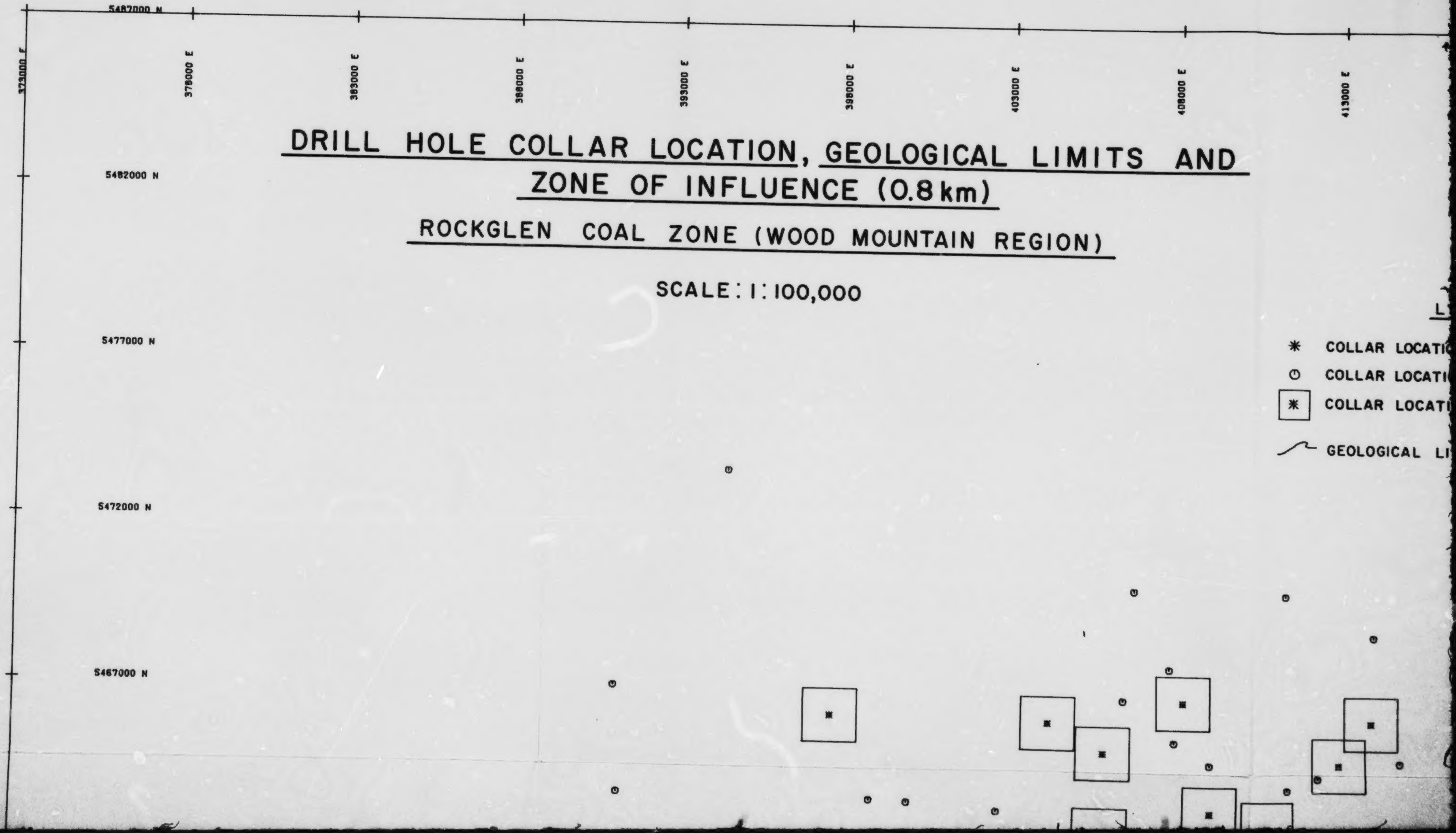

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1: 100,000

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OLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

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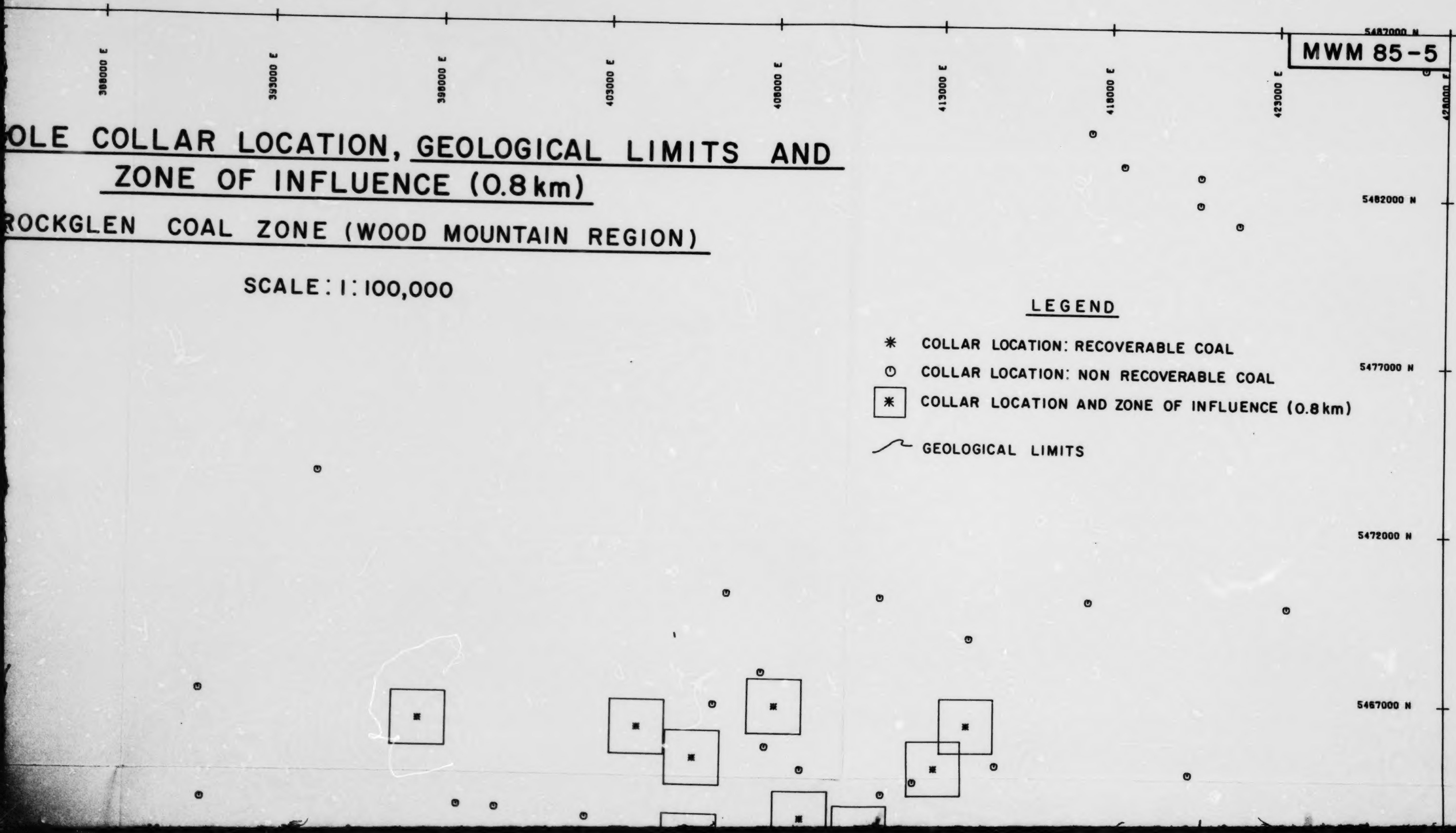

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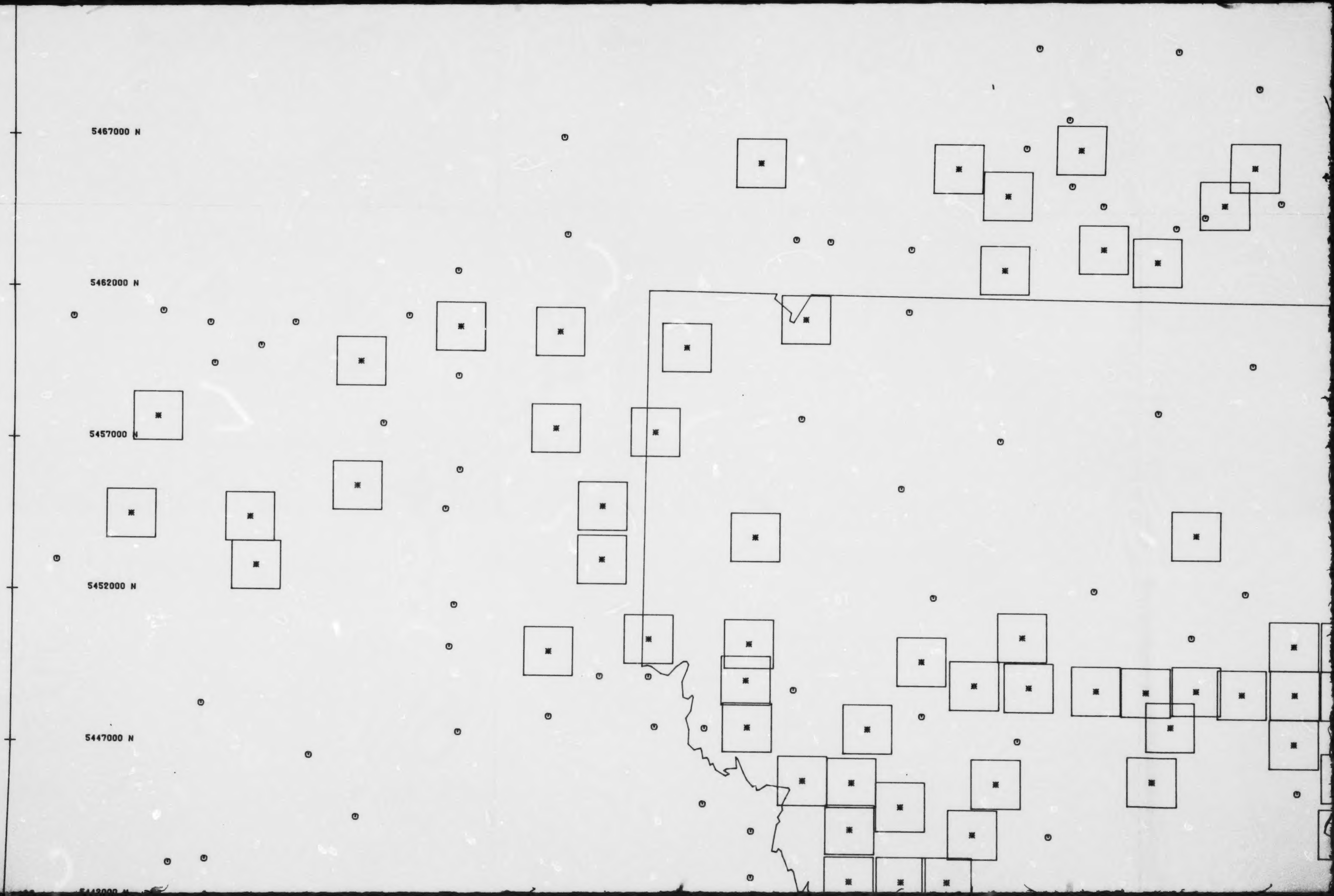
- ✳ COLLAR LOCATION: RECOVERABLE COAL
- ○ COLLAR LOCATION: NON RECOVERABLE COAL
- ☐✳ COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)
- ∼ GEOLOGICAL LIMITS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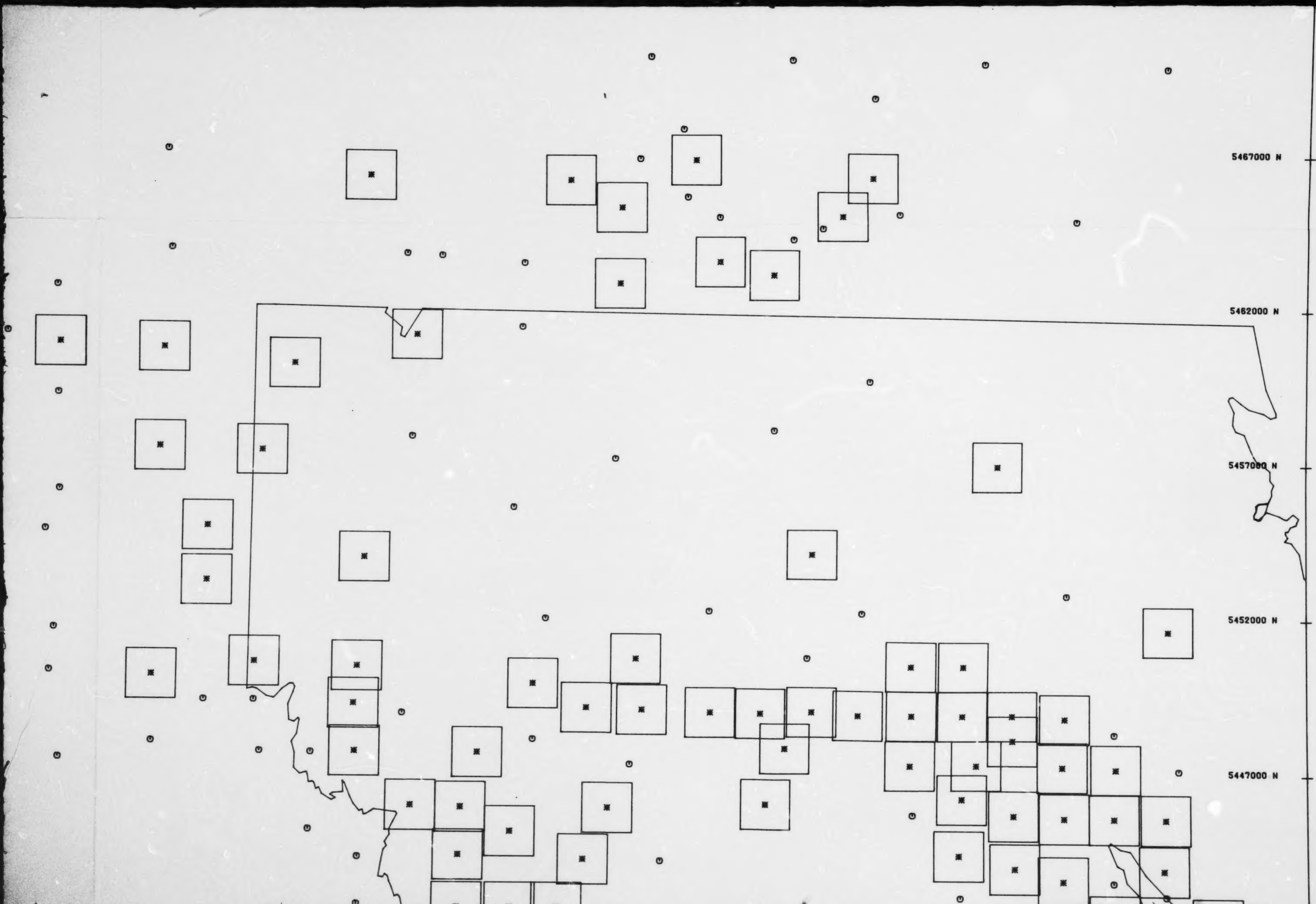
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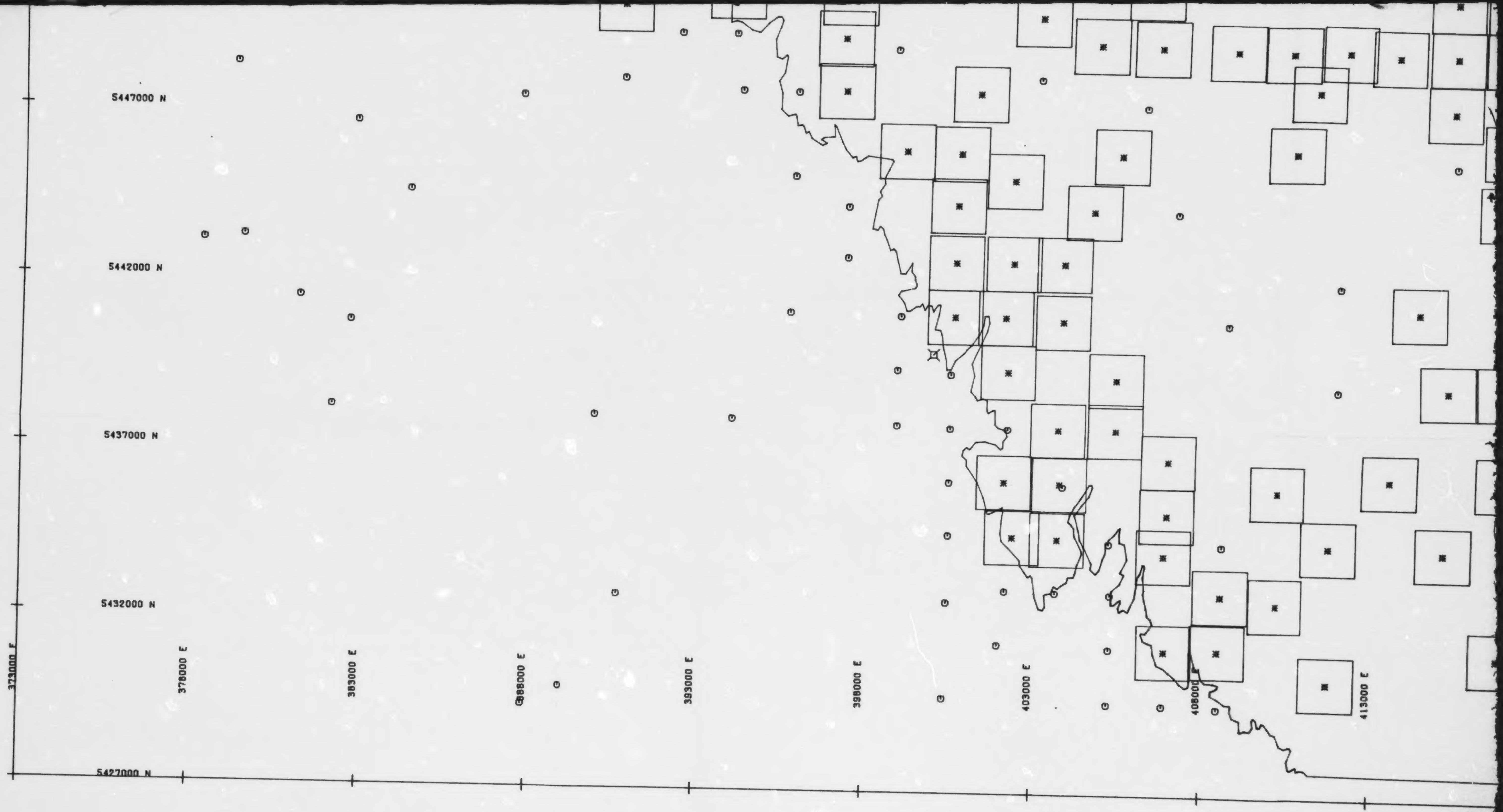
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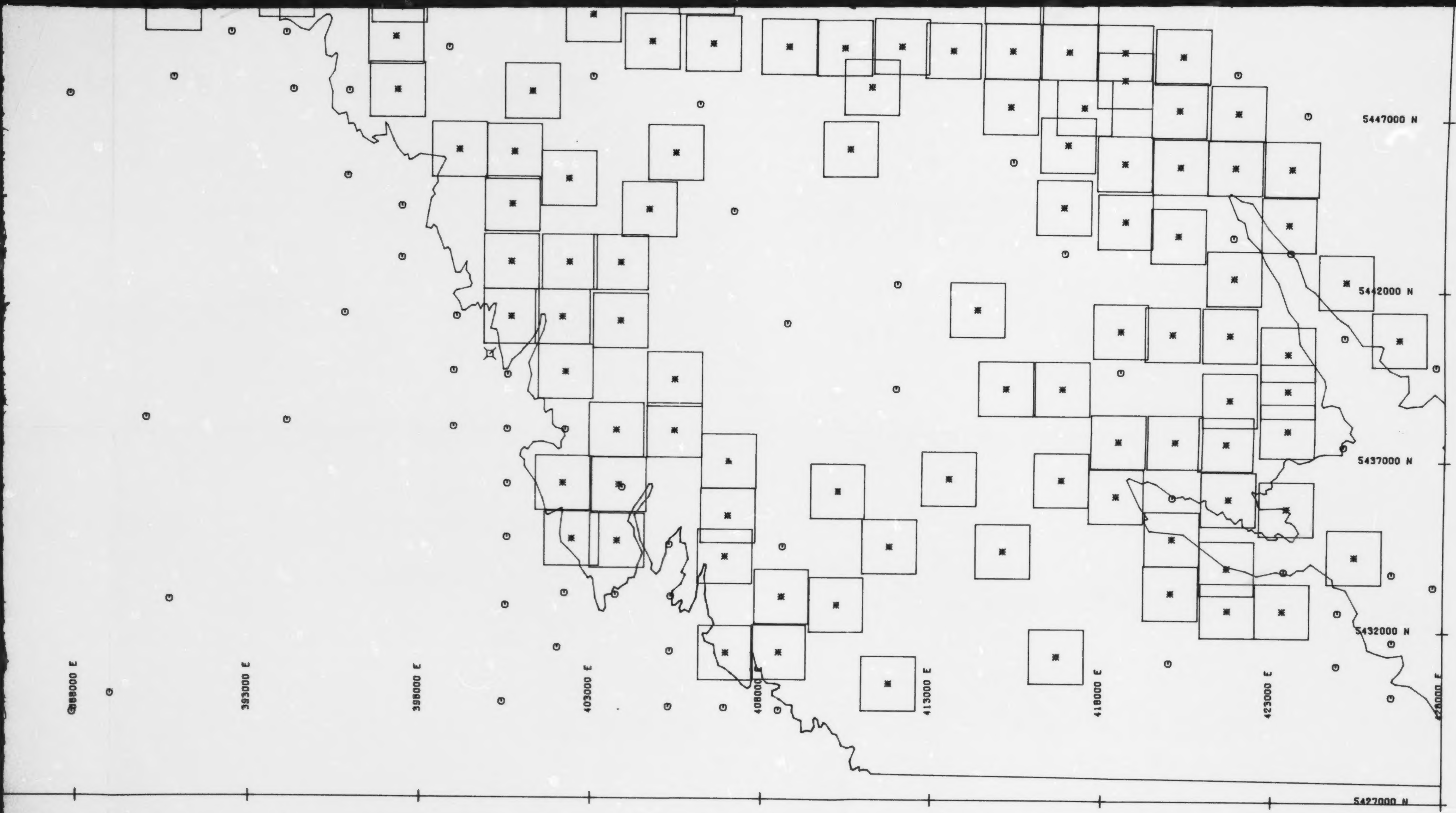
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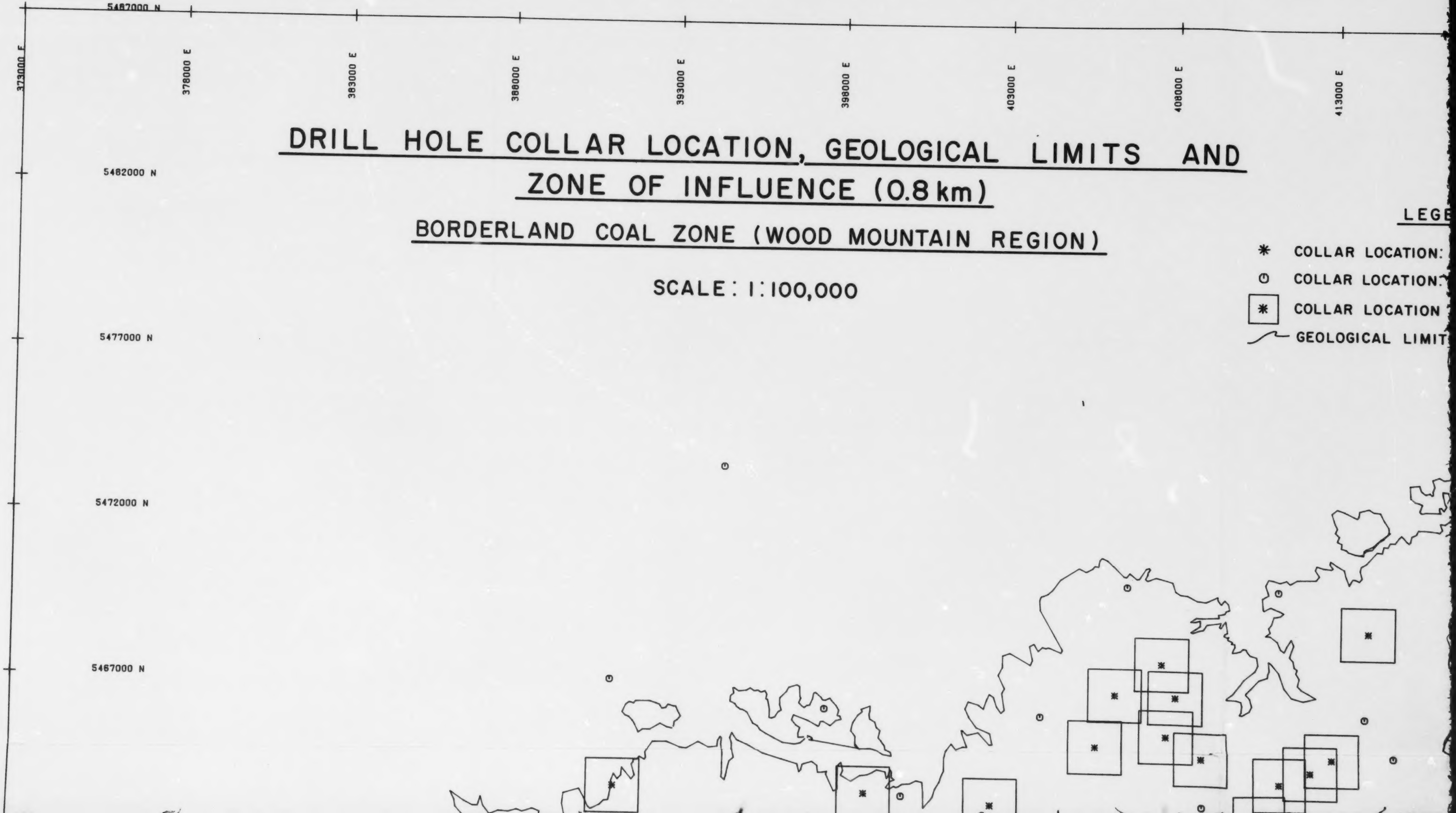
418000 E
423000 E
428000 E

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

BORDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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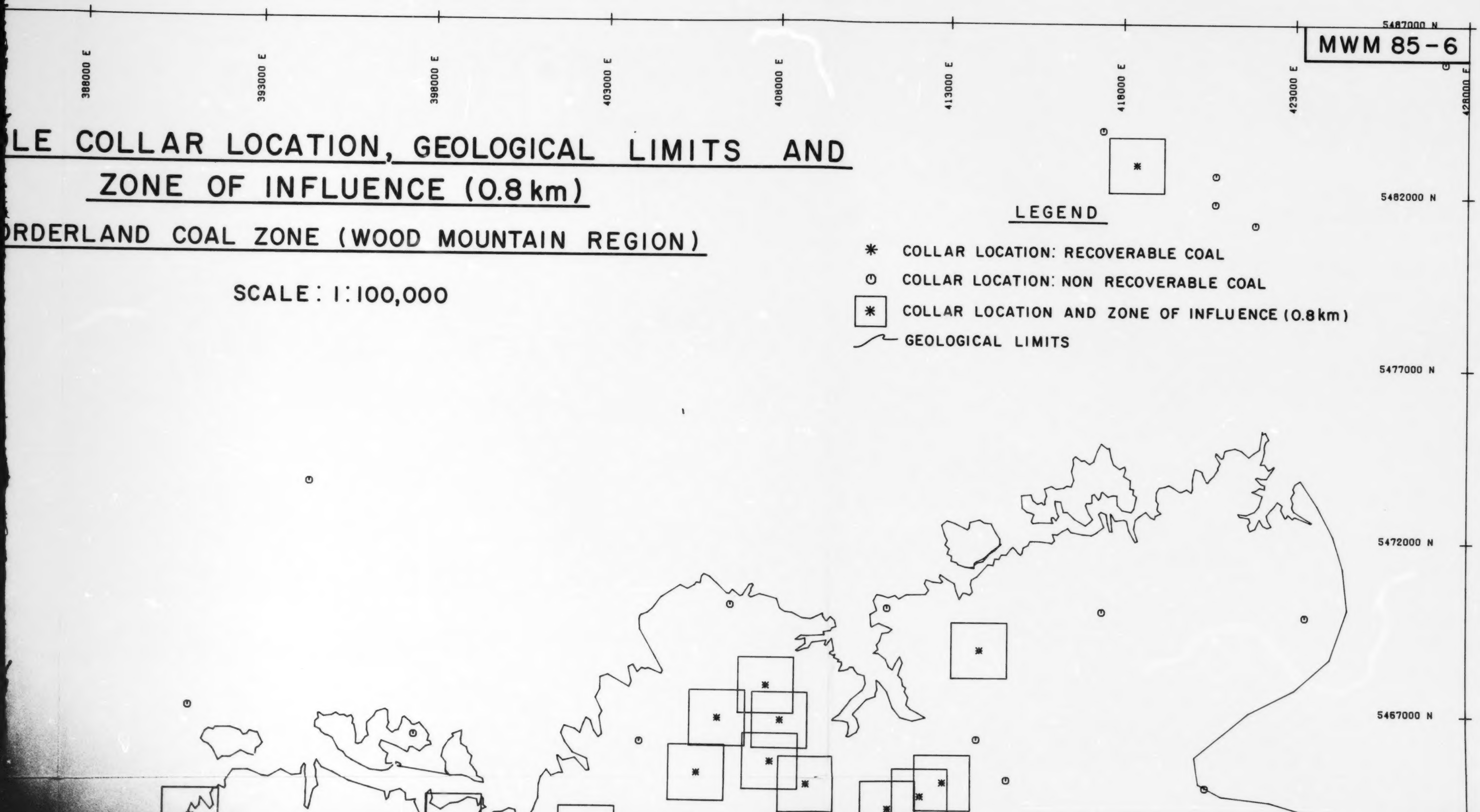
403000 E
408000 E
413000 E
5482000 N
5477000 N
5472000 N
5467000 N
LEGE
COLLAR LOCATION:
COLLAR LOCATION:
COLLAR LOCATION
GEOLOGICAL LIMIT

MWM 85-6

LE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

RDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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418000 E
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428000 E
5487000 N
5482000 N
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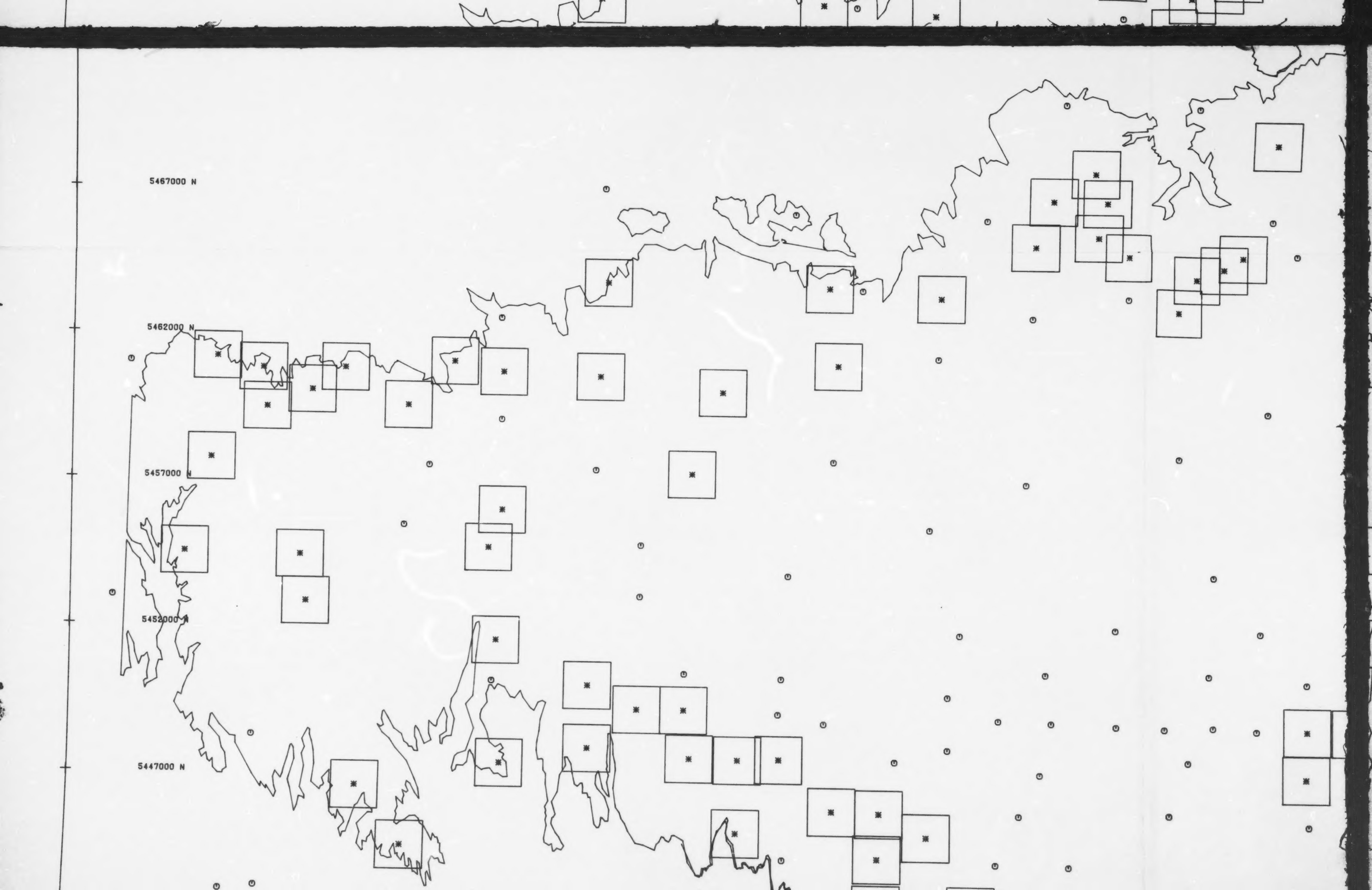
5472000 N
5467000 N

LEGEND

- ✱ COLLAR LOCATION: RECOVERABLE COAL
- ʘ COLLAR LOCATION: NON RECOVERABLE COAL
- ☐ COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)
- 〜 GEOLOGICAL LIMITS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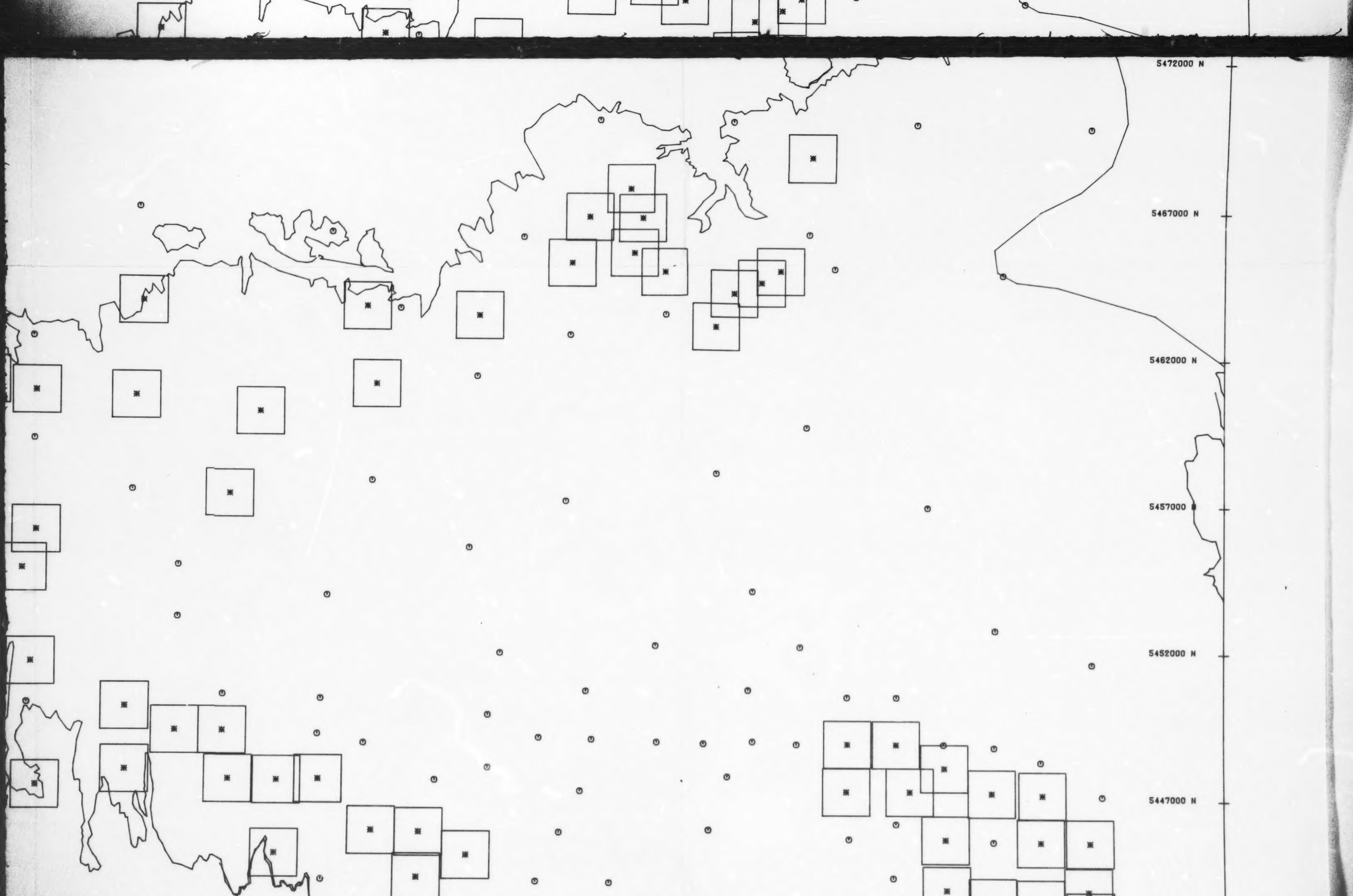
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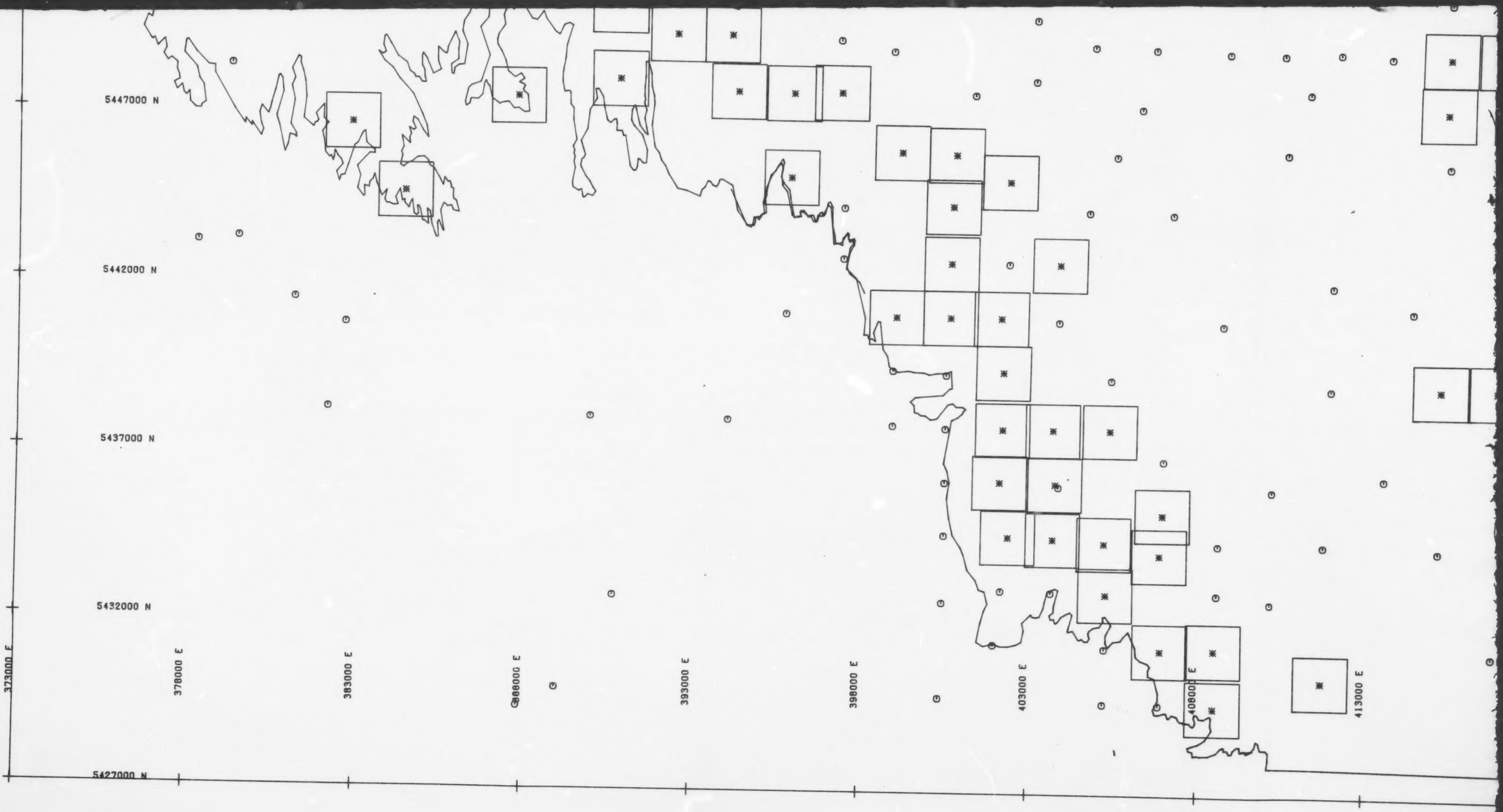
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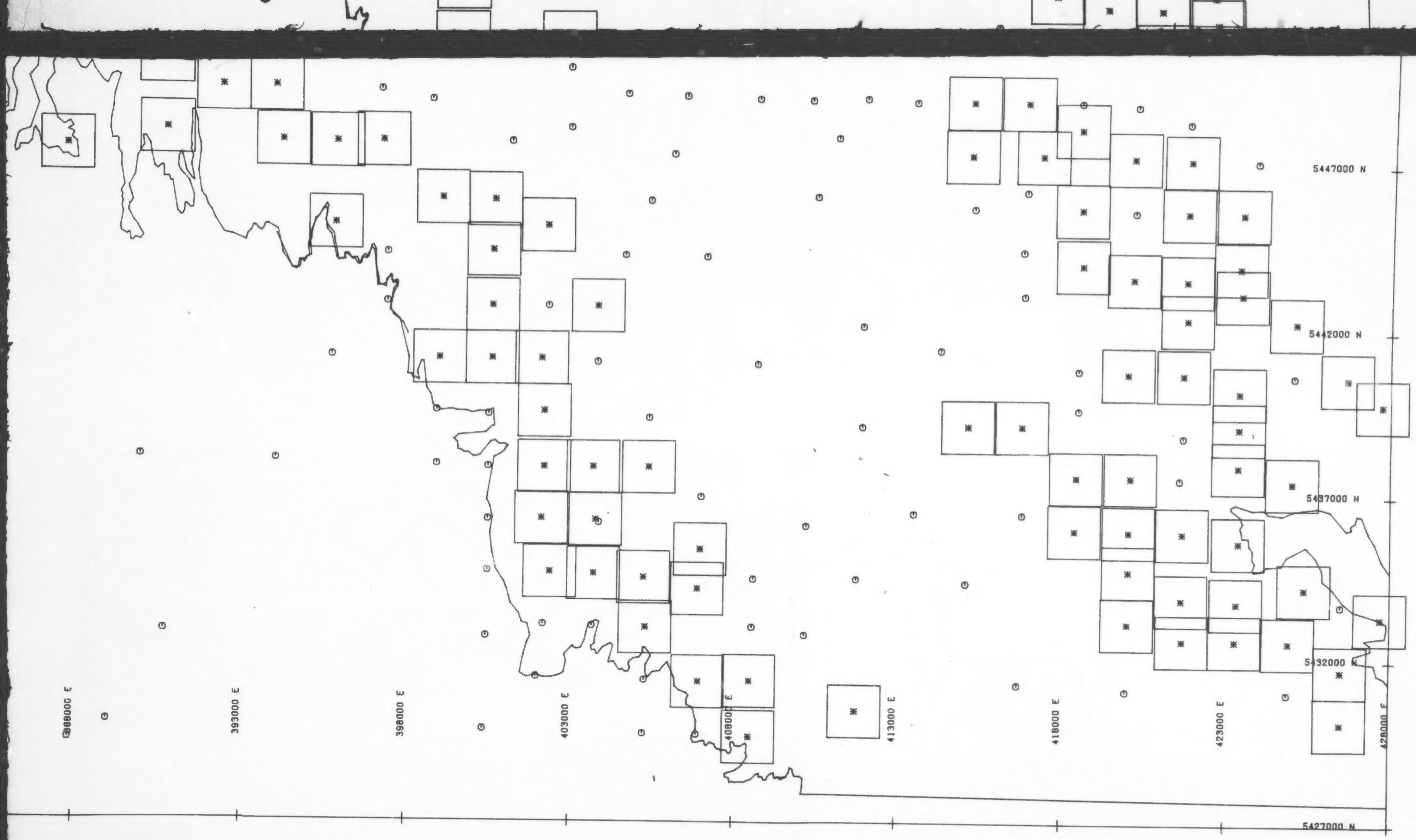
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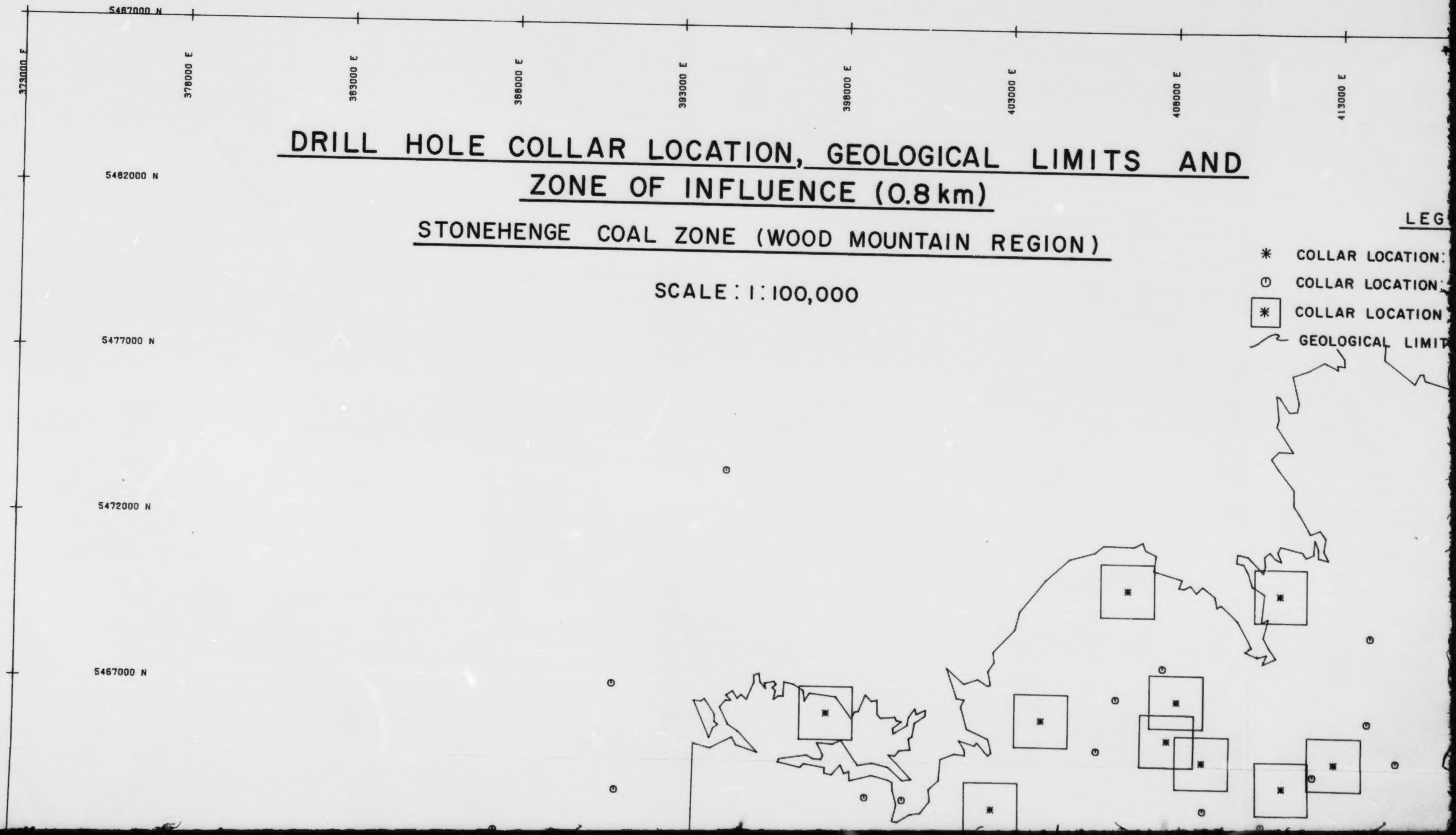
403000 E
408000 E
413000 E
418000 E
423000 E
428000 E

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

STONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1 : 100,000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413000 E
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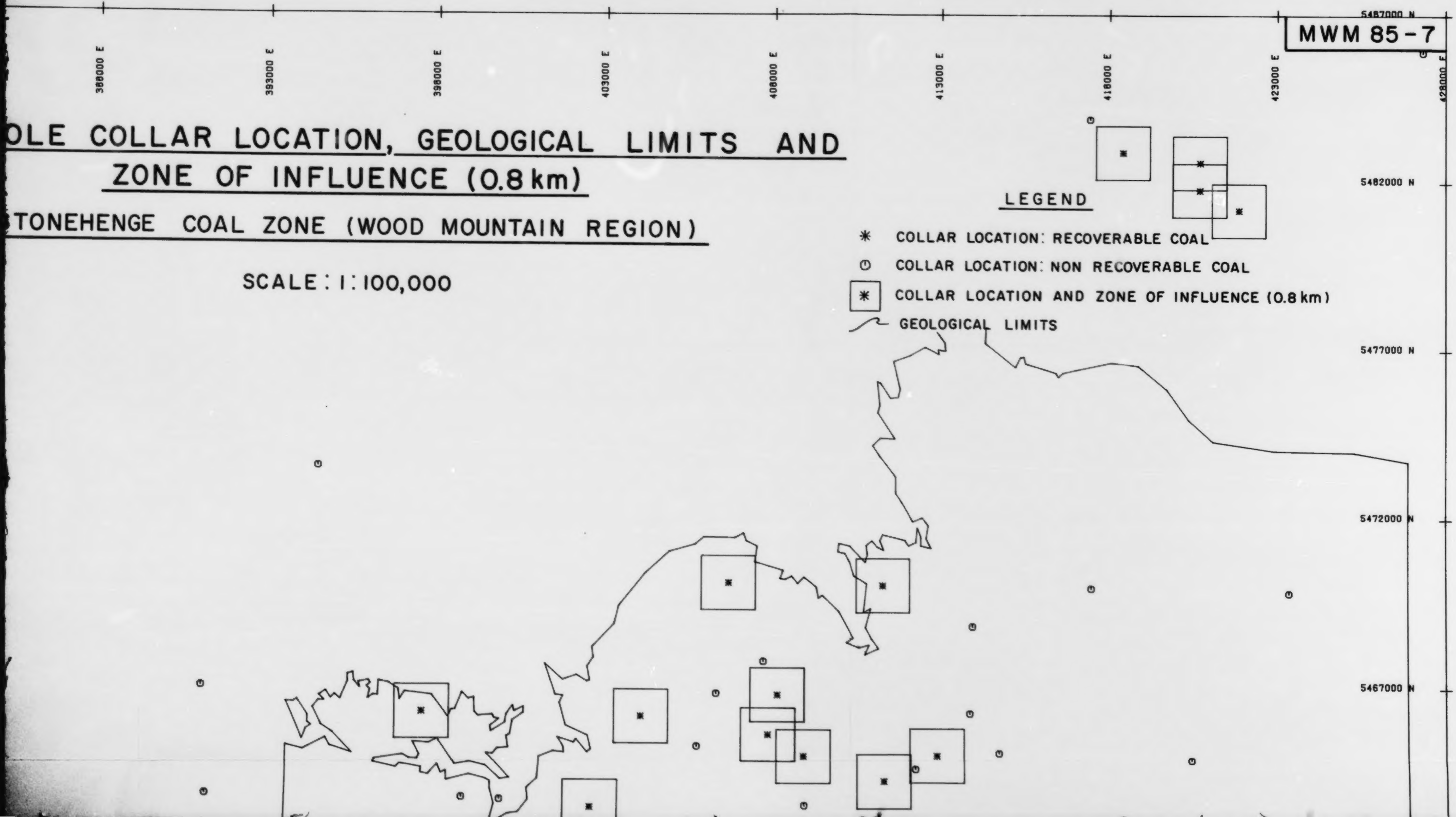
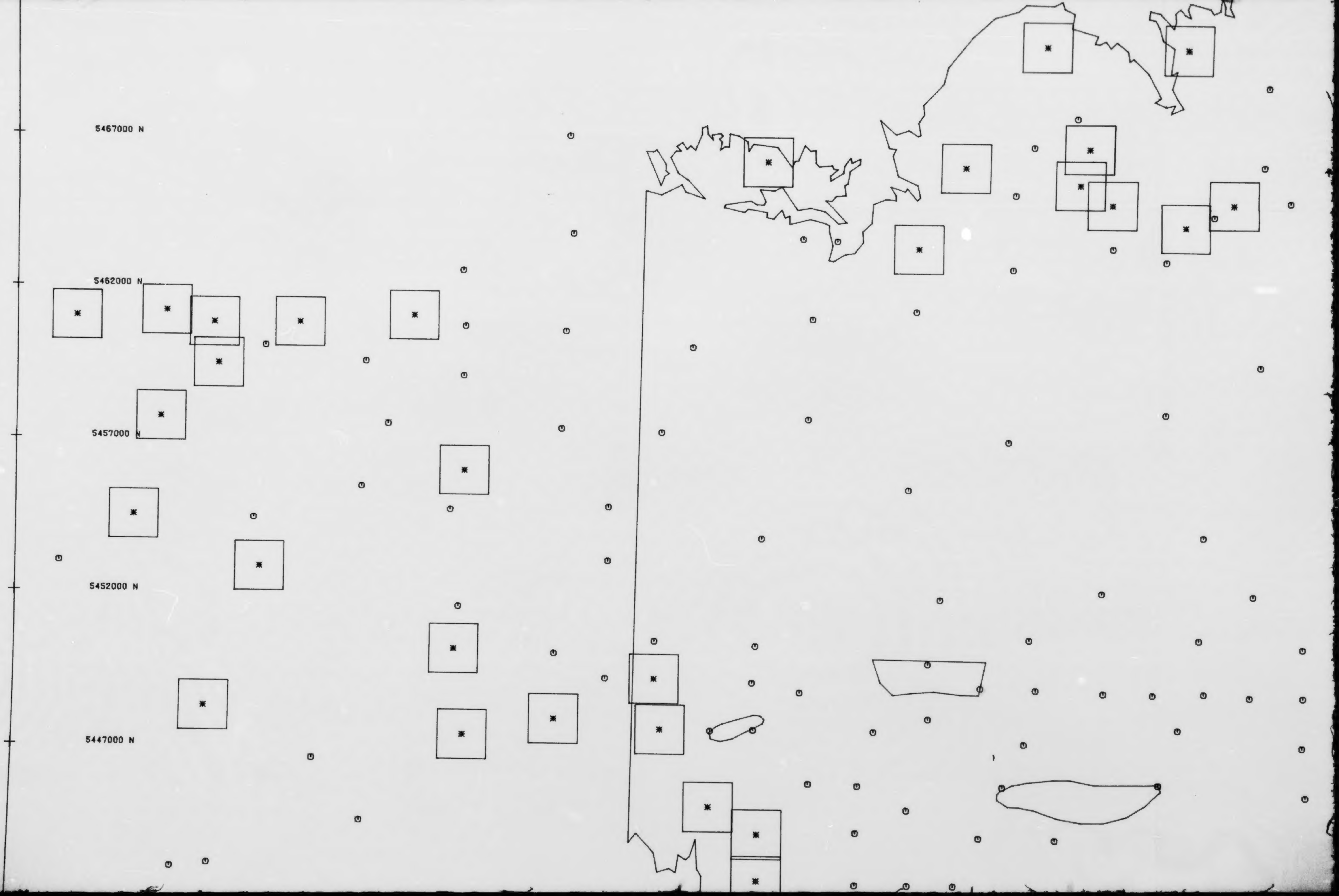
5477000 N
5472000 N
5467000 N
LEG
✱ COLLAR LOCATION:
ʘ COLLAR LOCATION:
✱ COLLAR LOCATION
GEOLOGICAL LIMIT

OLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

TONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1 : 100,000


MWM 85-7
388000 E
393000 E
398000 E
403000 E
408000 E
413000 E
418000 E
423000 E
428000 E
5487000 N
5482000 N
5477000 N
5472000 N
5467000 N
LEGEND
COLLAR LOCATION: RECOVERABLE COAL
COLLAR LOCATION: NON RECOVERABLE COAL
COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)
GEOLOGICAL LIMITS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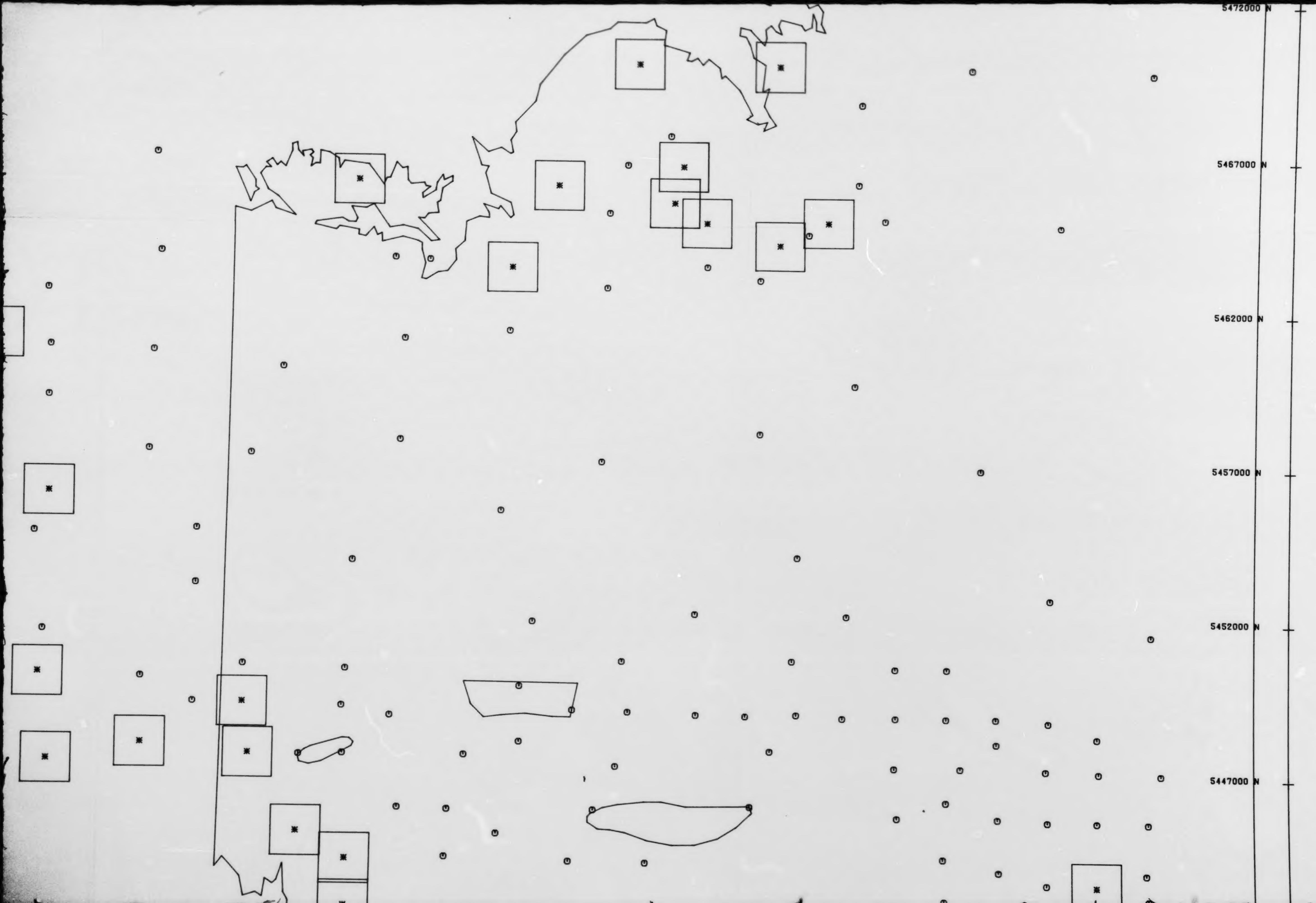
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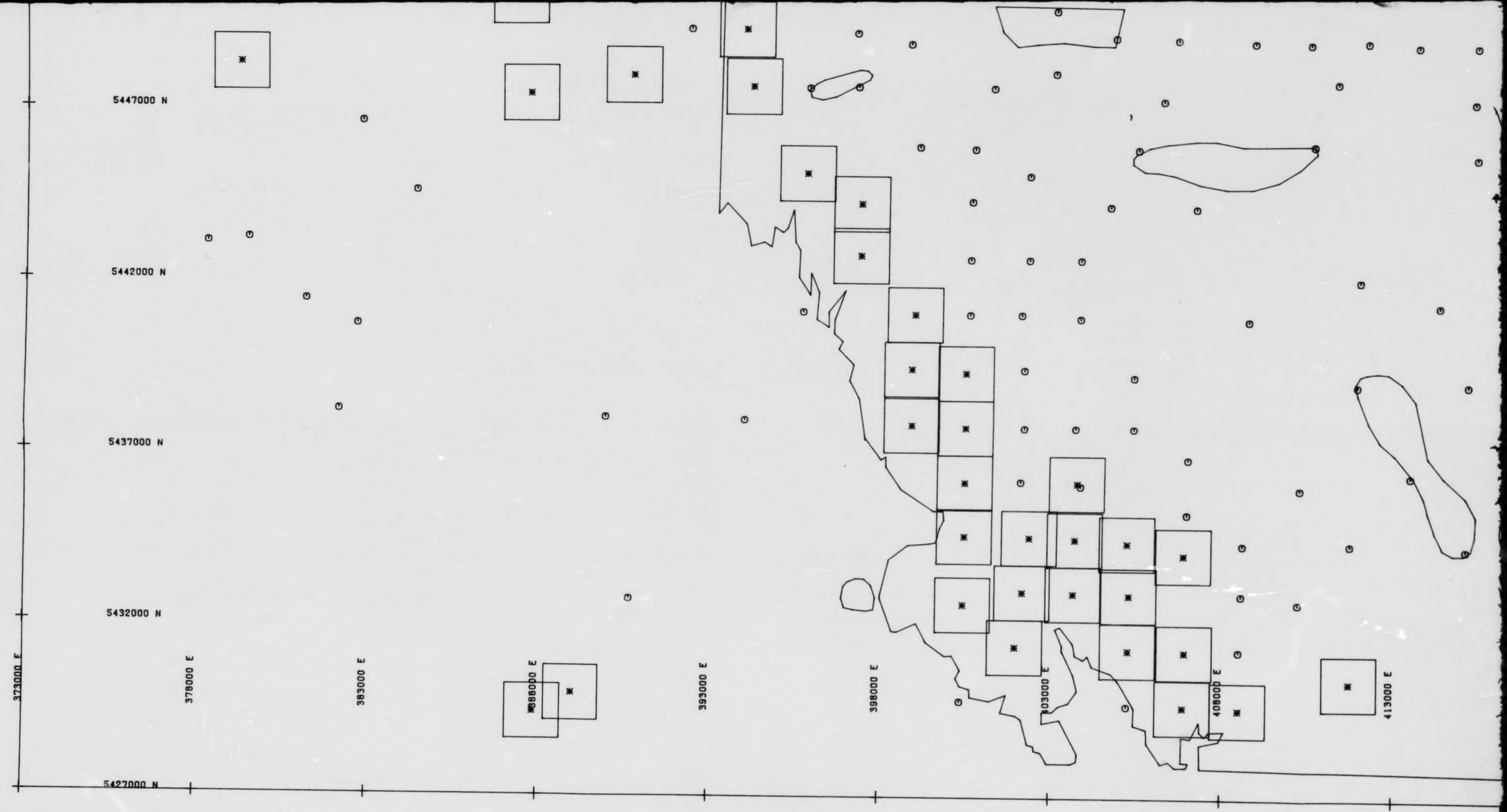
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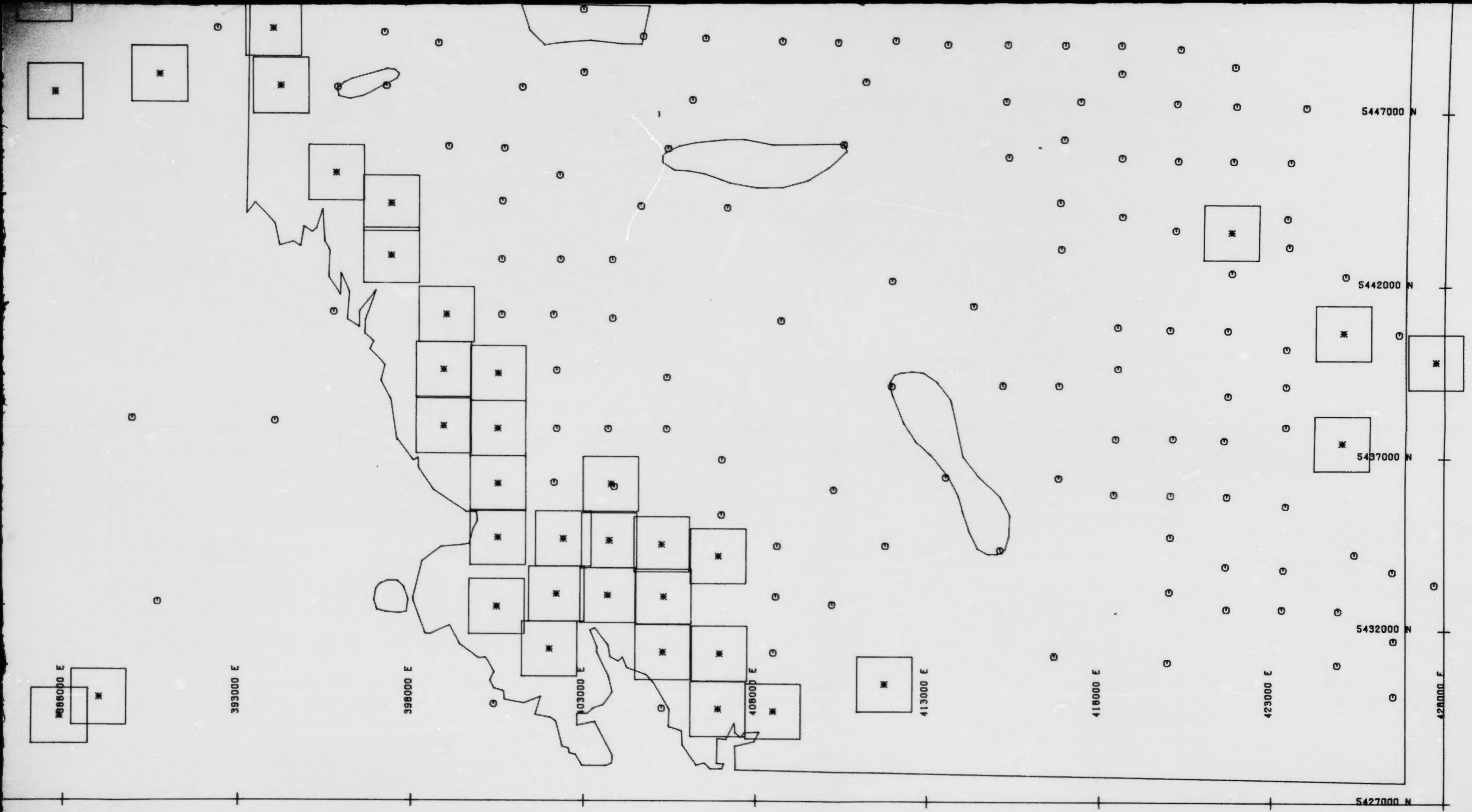
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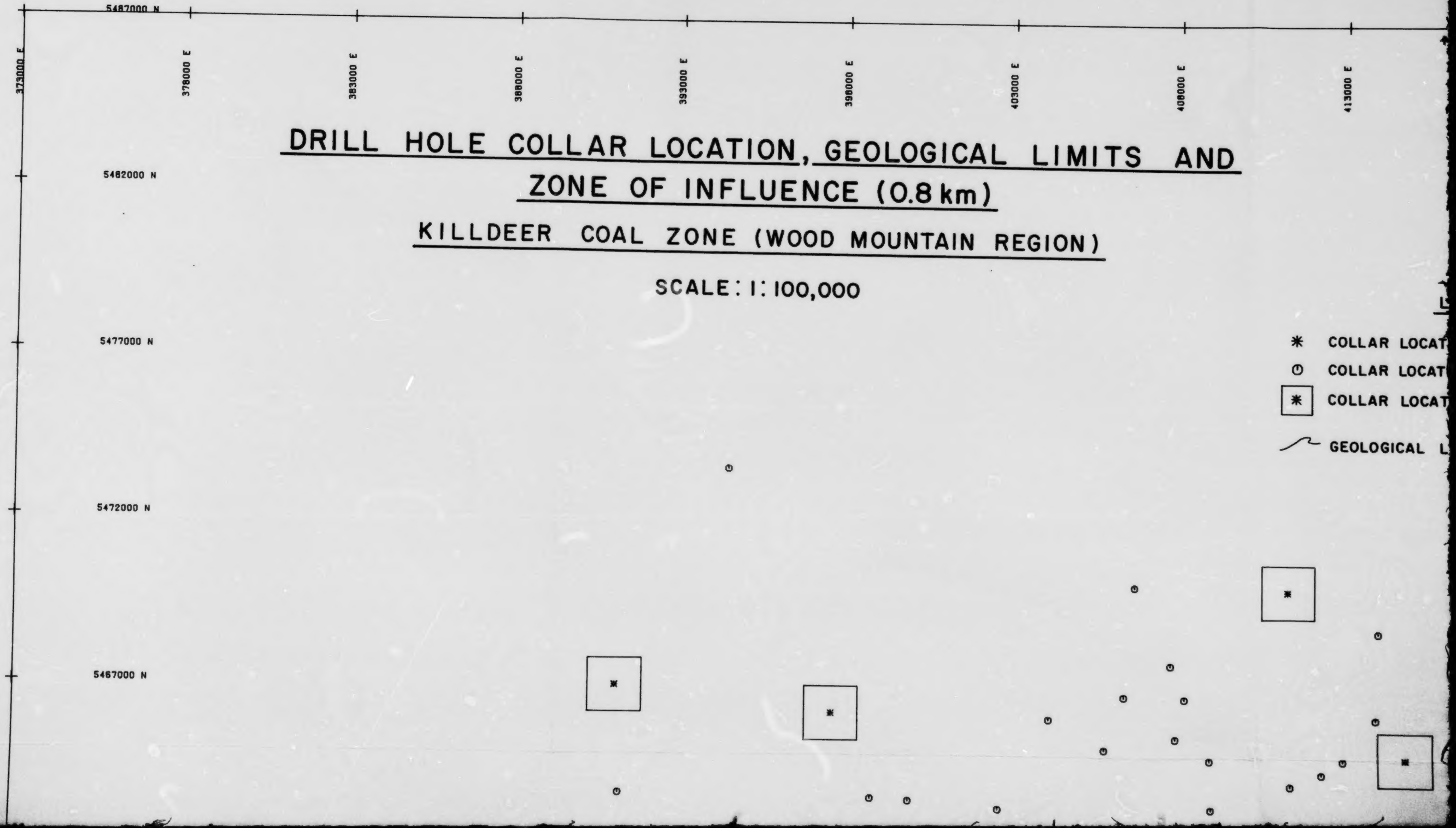
408000 E
413000 E
418000 E
423000 E
428000 E

DRILL HOLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1: 100,000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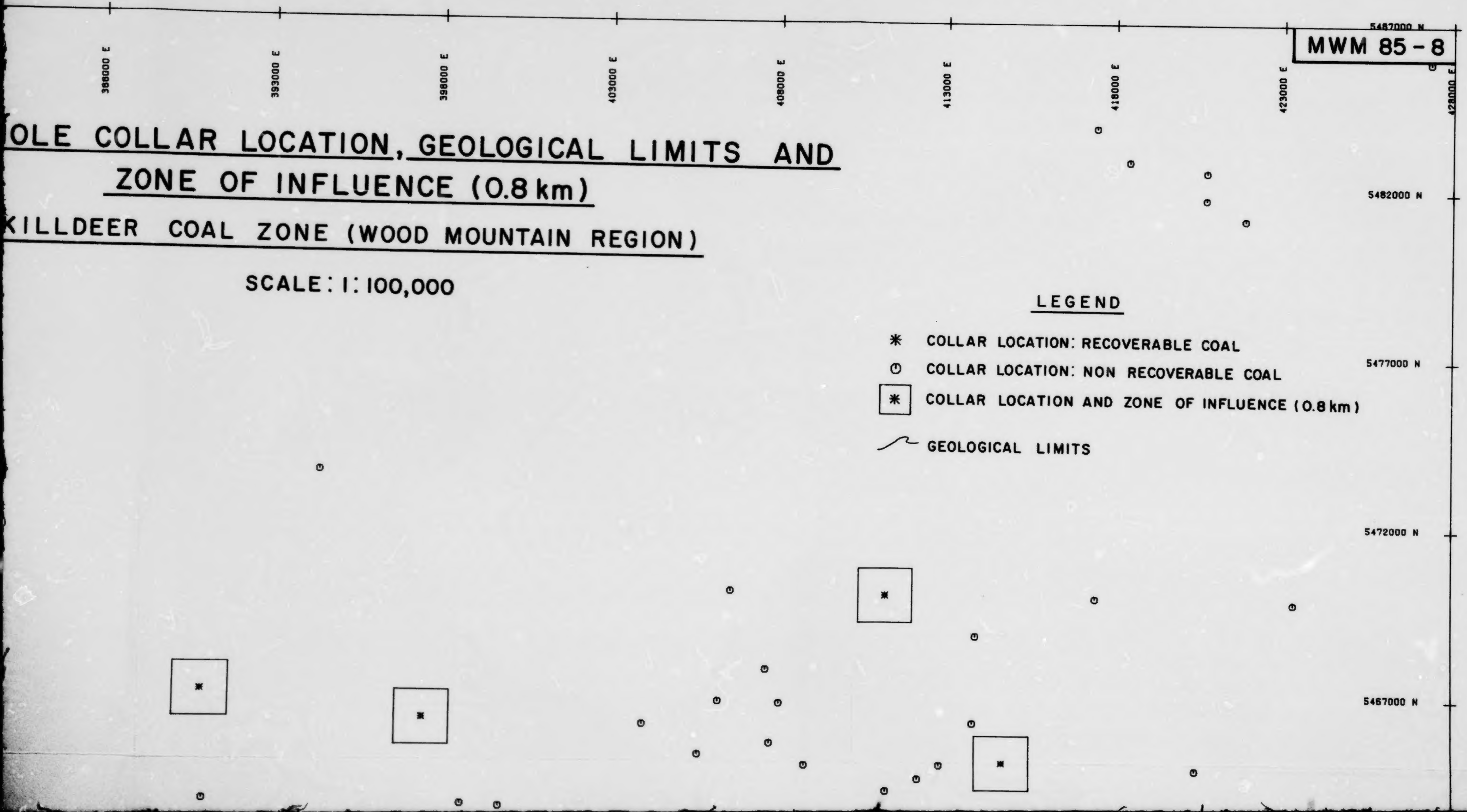
408000 E
413000 E
5482000 N
5477000 N
5472000 N
5467000 N
✳ COLLAR LOCAT
⊙ COLLAR LOCAT
✳ COLLAR LOCAT
GEOLOGICAL L

MWM 85 - 8

OLE COLLAR LOCATION, GEOLOGICAL LIMITS AND ZONE OF INFLUENCE (0.8 km)

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1: 100,000



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403000 E
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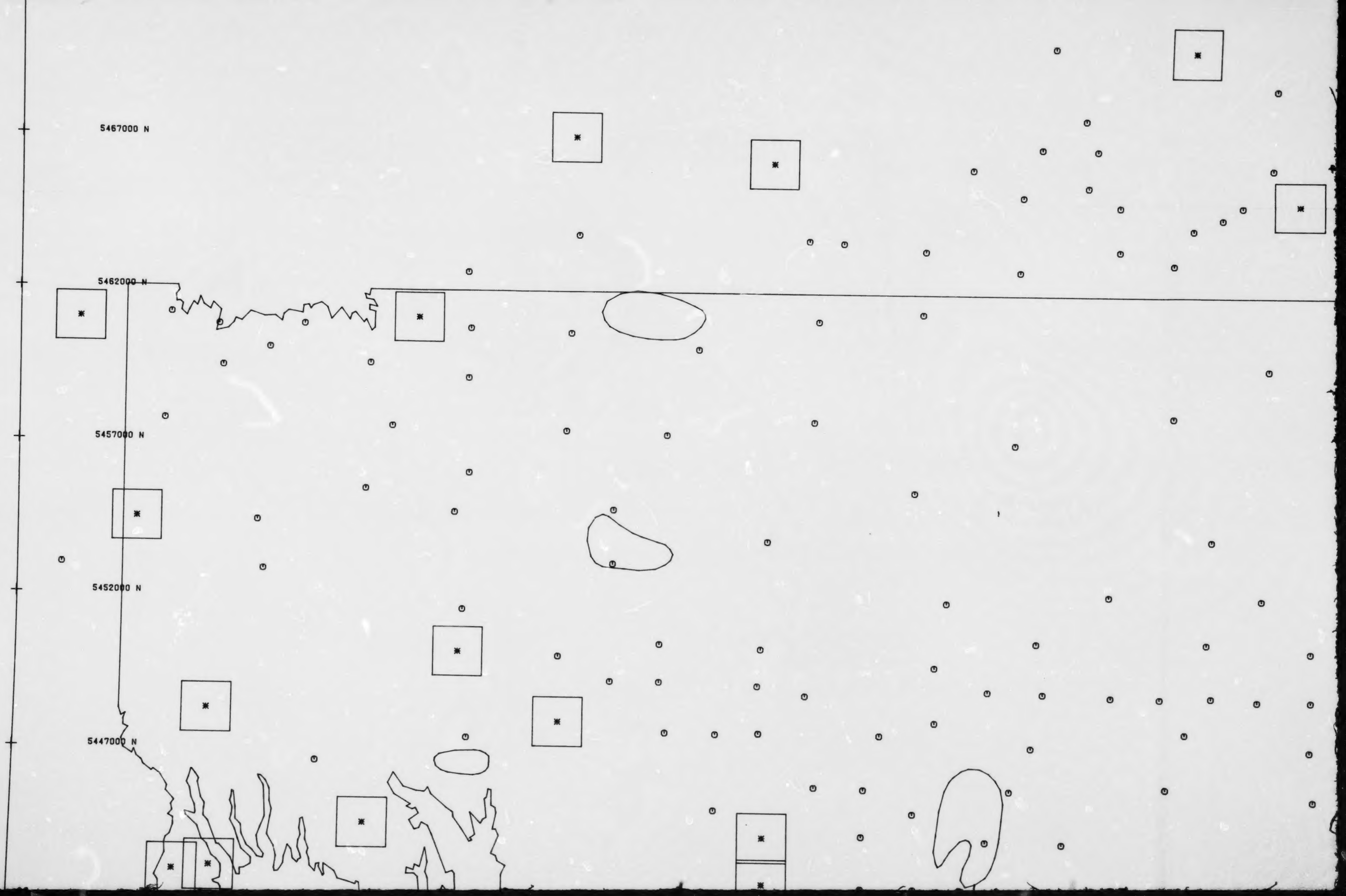
413000 E
418000 E
423000 E
428000 E
5487000 N
5482000 N
5477000 N
5472000 N
5467000 N
LEGEND
✳ COLLAR LOCATION: RECOVERABLE COAL
⊙ COLLAR LOCATION: NON RECOVERABLE COAL
☐ COLLAR LOCATION AND ZONE OF INFLUENCE (0.8 km)
GEOLOGICAL LIMITS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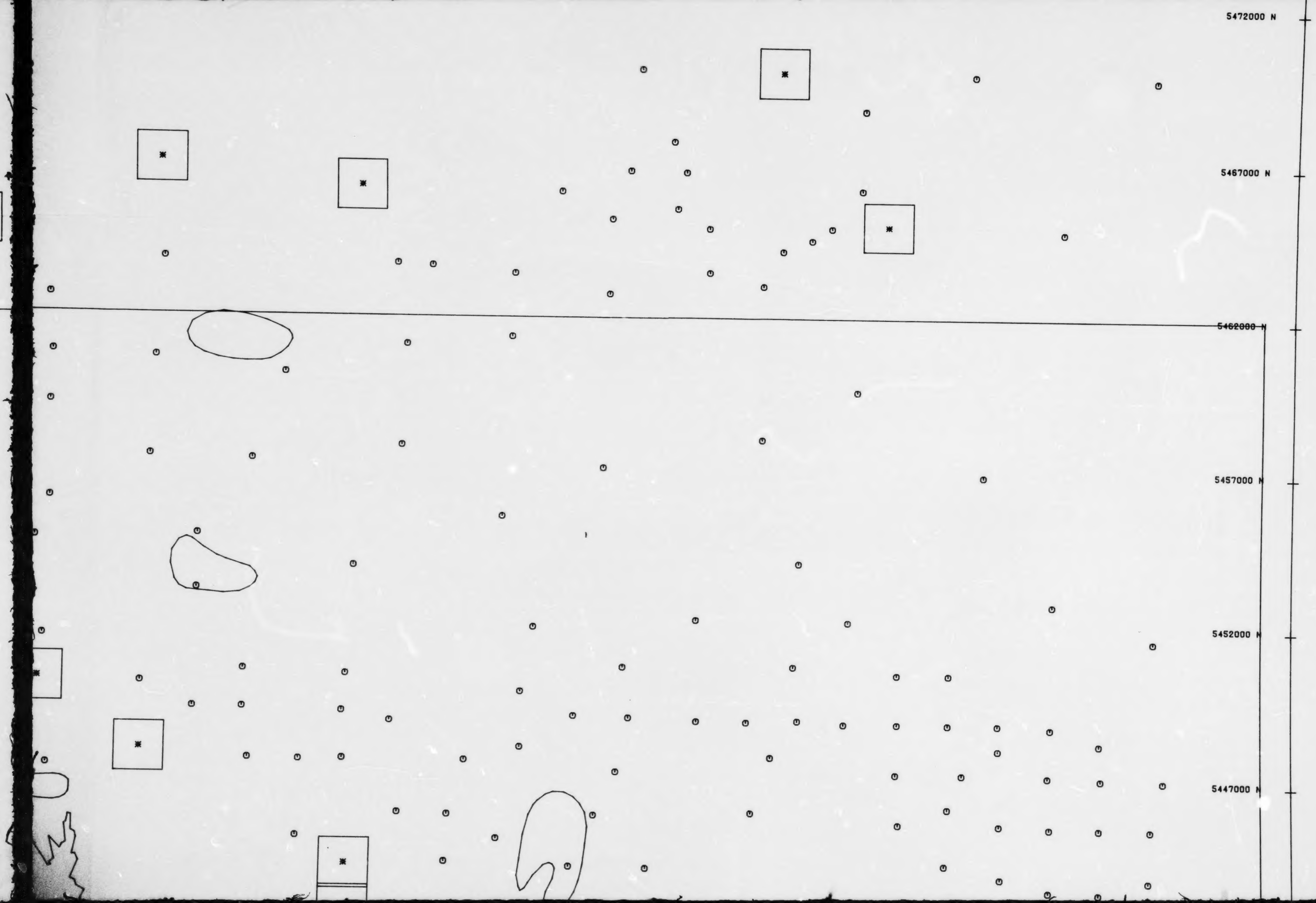
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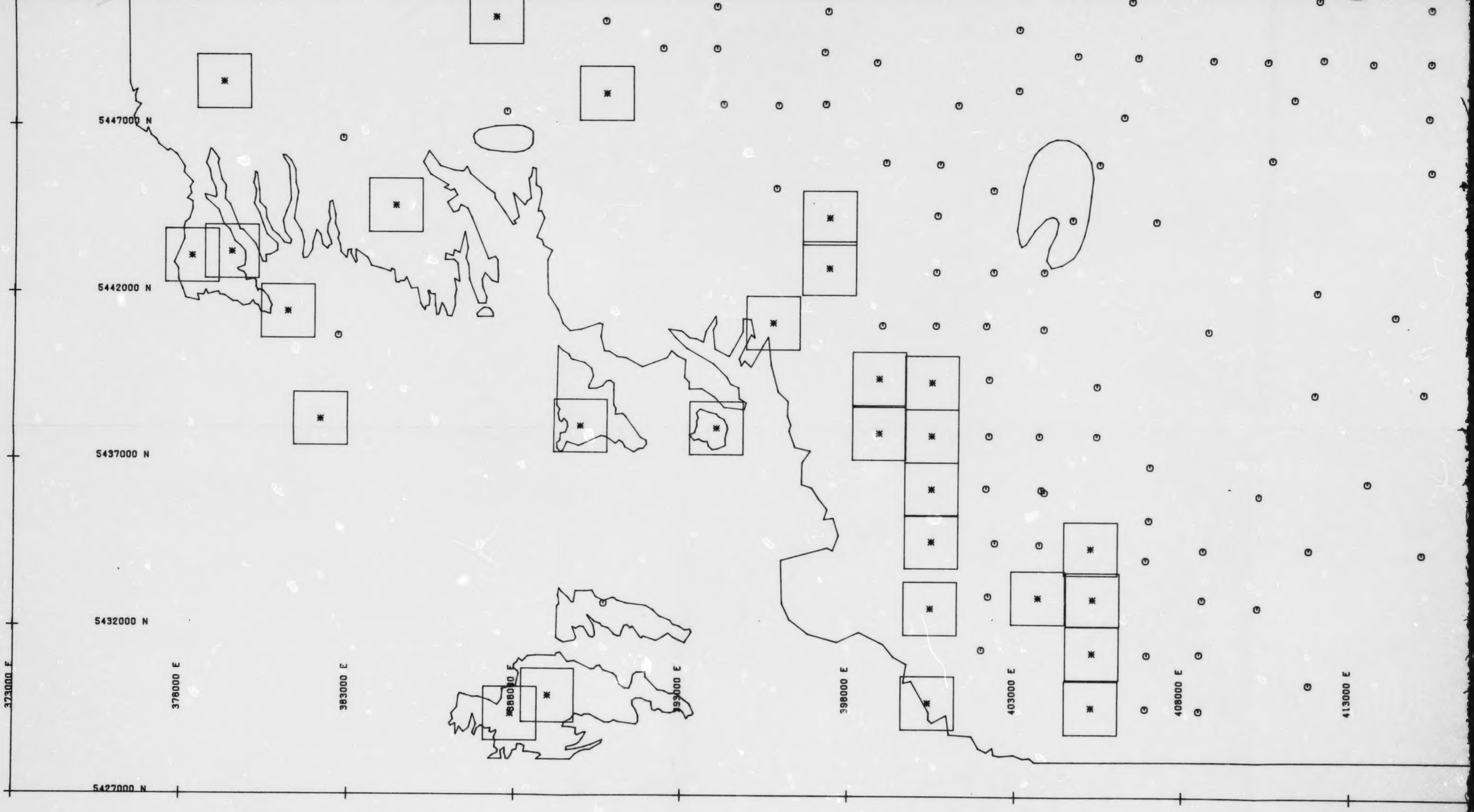
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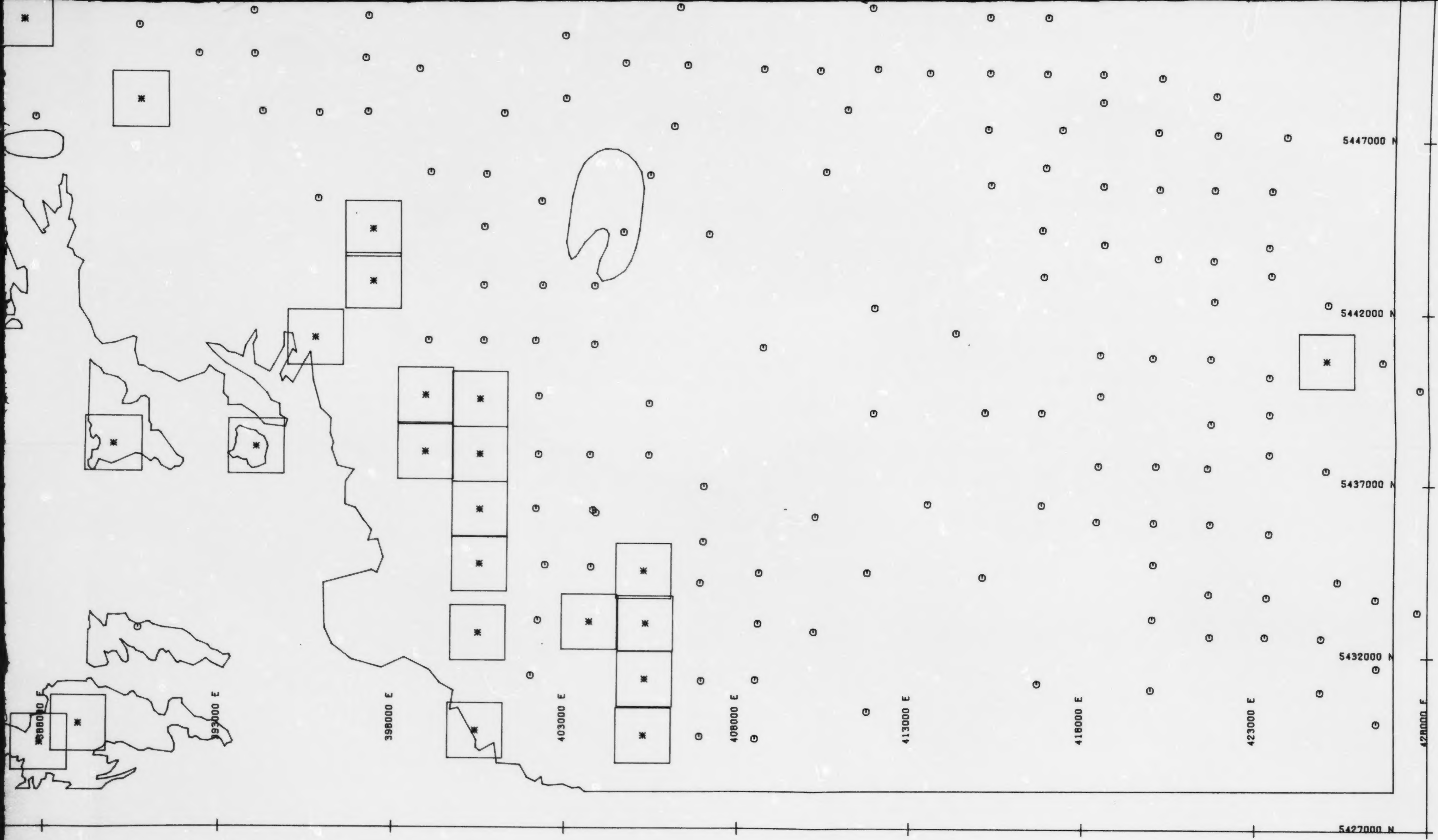
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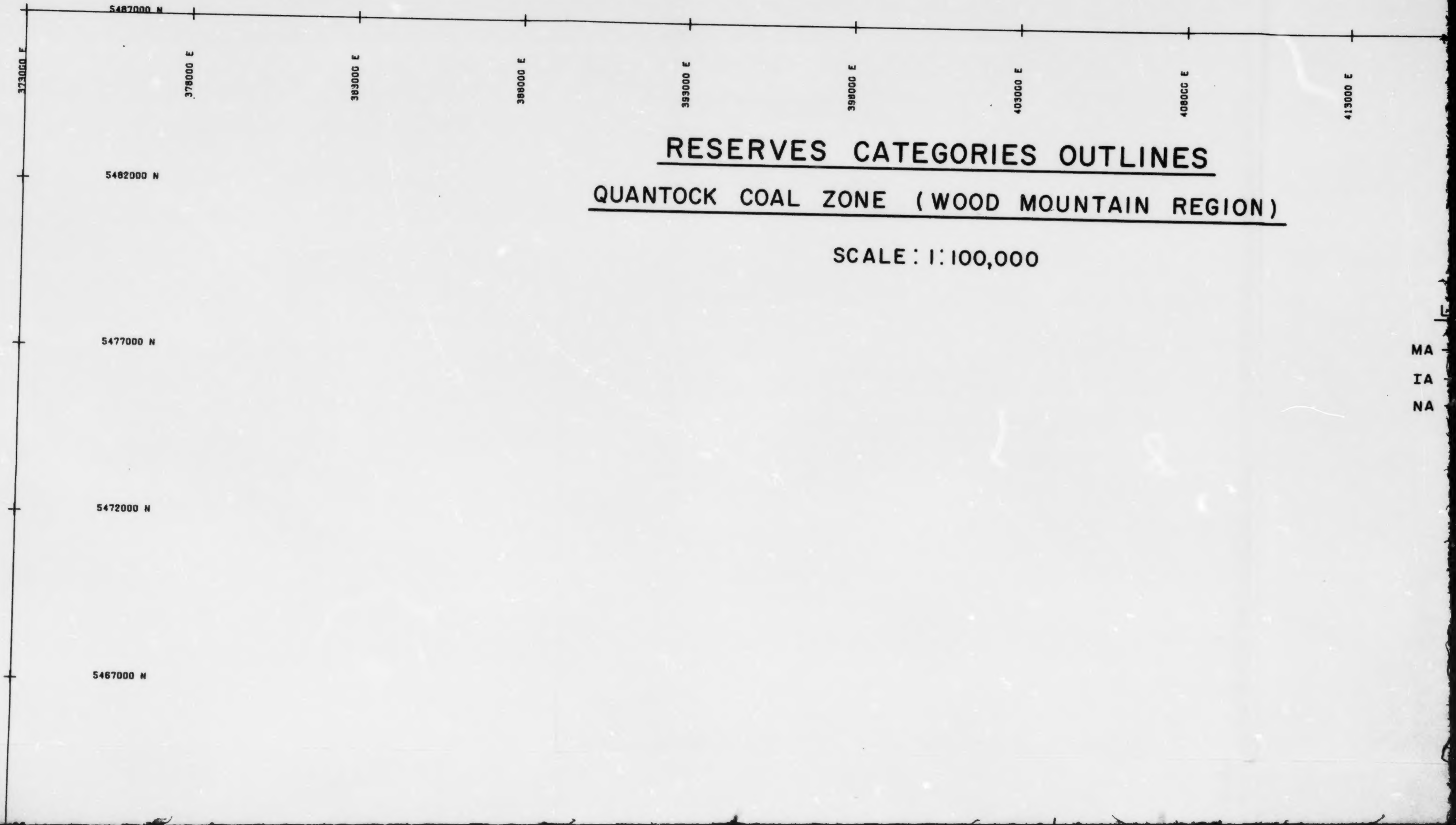
428000 E

RESERVES CATEGORIES OUTLINES

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1: 100,000



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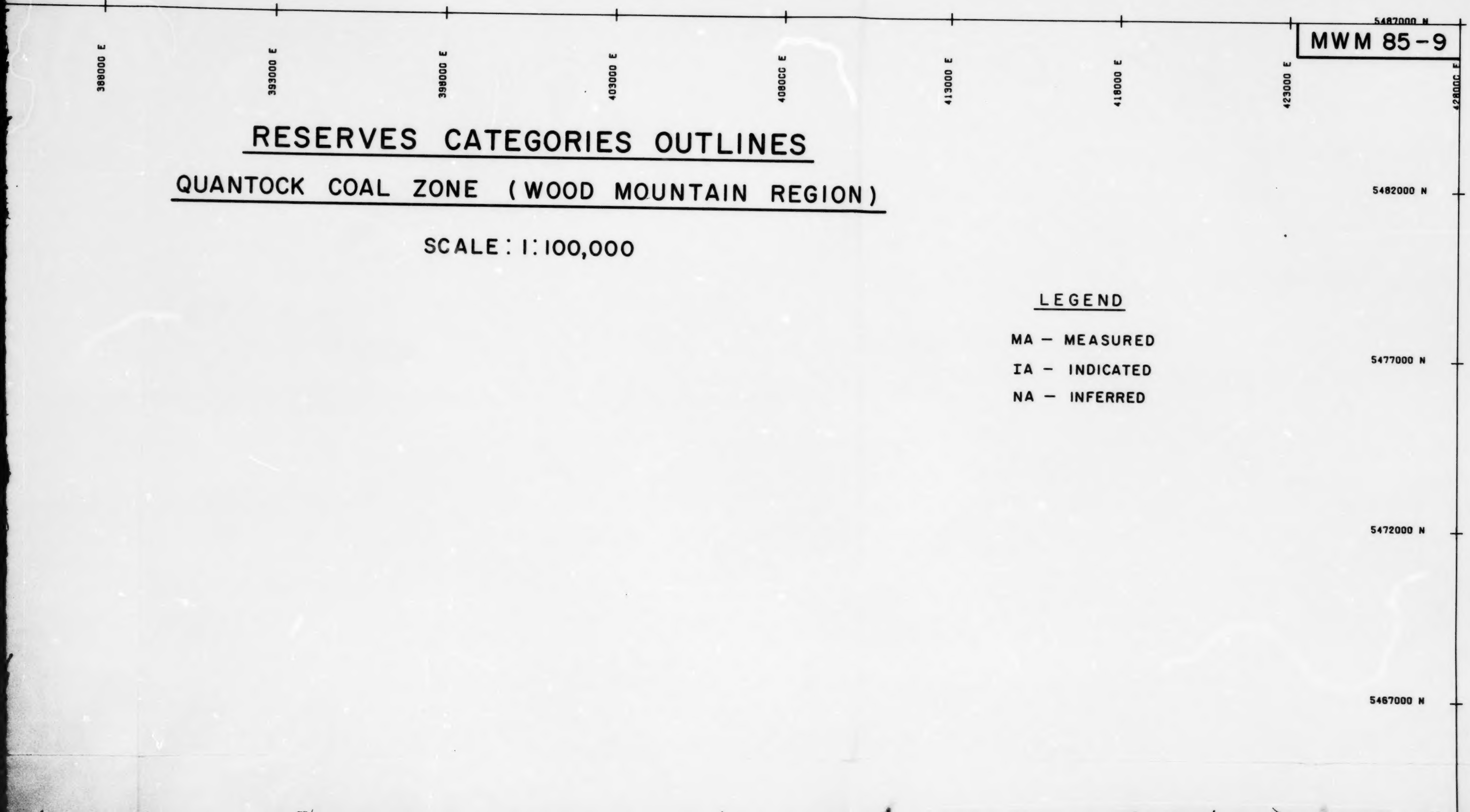
378000 E
383000 E
388000 E
393000 E
398000 E
403000 E
408000 E
413000 E
MA
IA
NA

MWM 85-9

RESERVES CATEGORIES OUTLINES

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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398000 E
403000 E
408000 E
413000 E
418000 E
423000 E
428000 E
5487000 N
5482000 N
5477000 N
5472000 N
5467000 N

LEGEND

MA — MEASURED
IA — INDICATED
NA — INFERRED

5467000 N
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5452000 N
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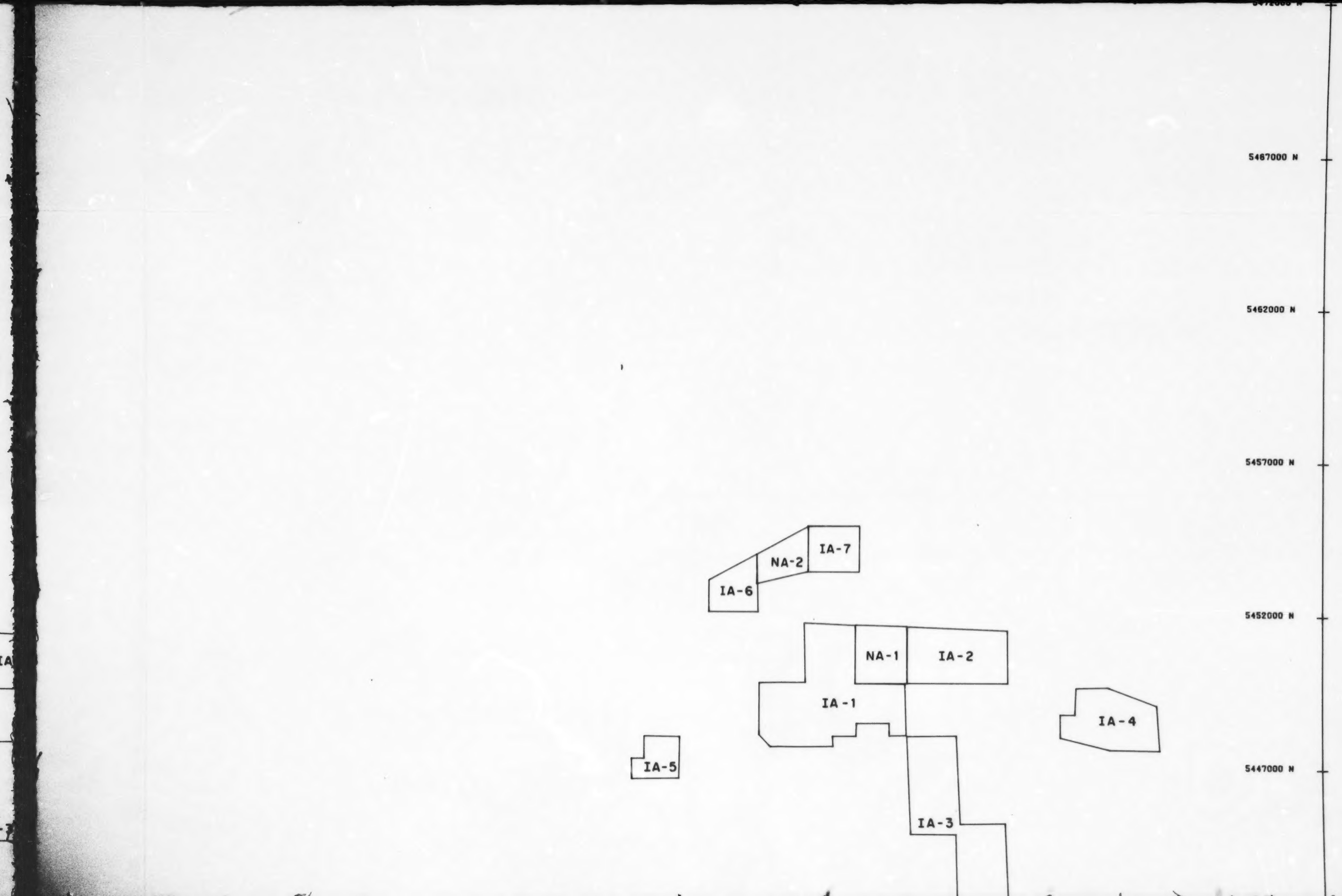
IA-7
NA-2
IA-6
NA-1
IA
IA-1
IA-5
IA-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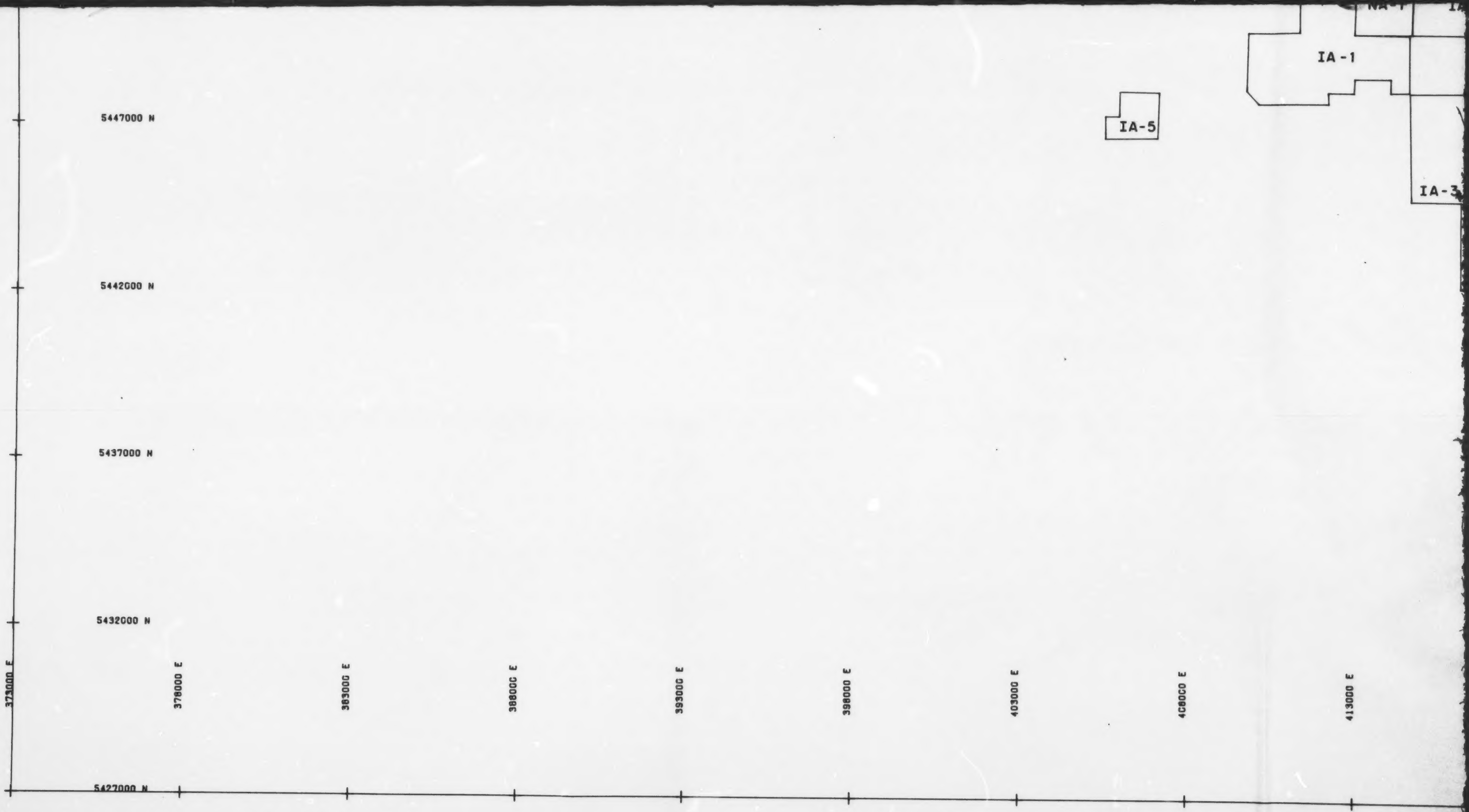
NA-1
IA-2
IA-1
IA-4
IA-5
IA-3
IA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IA-5
IA-3
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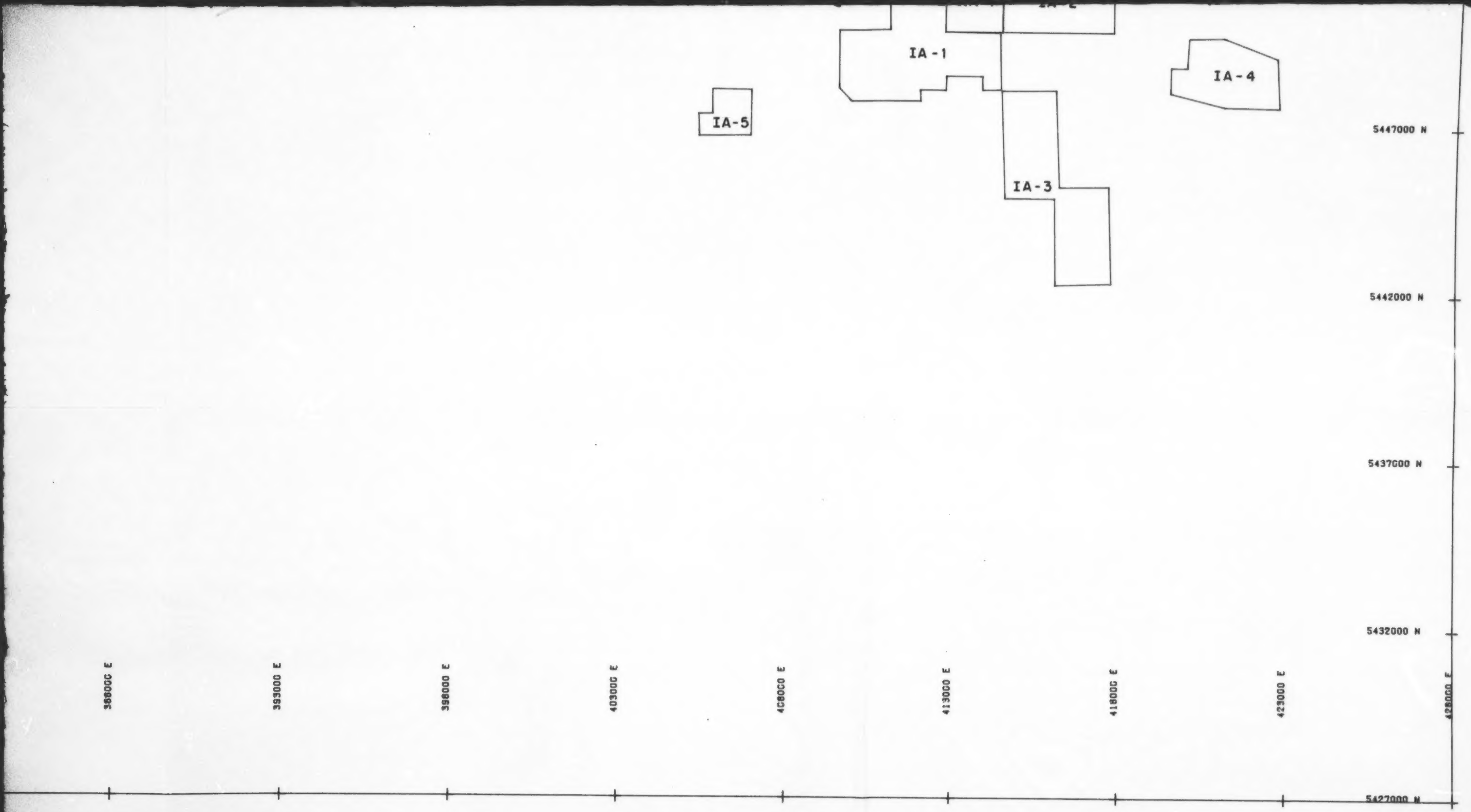
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IA-4
IA-5
IA-3
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5437000 N
5432000 N
5427000 N
388000 E
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398000 E
403000 E
408000 E
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418000 E
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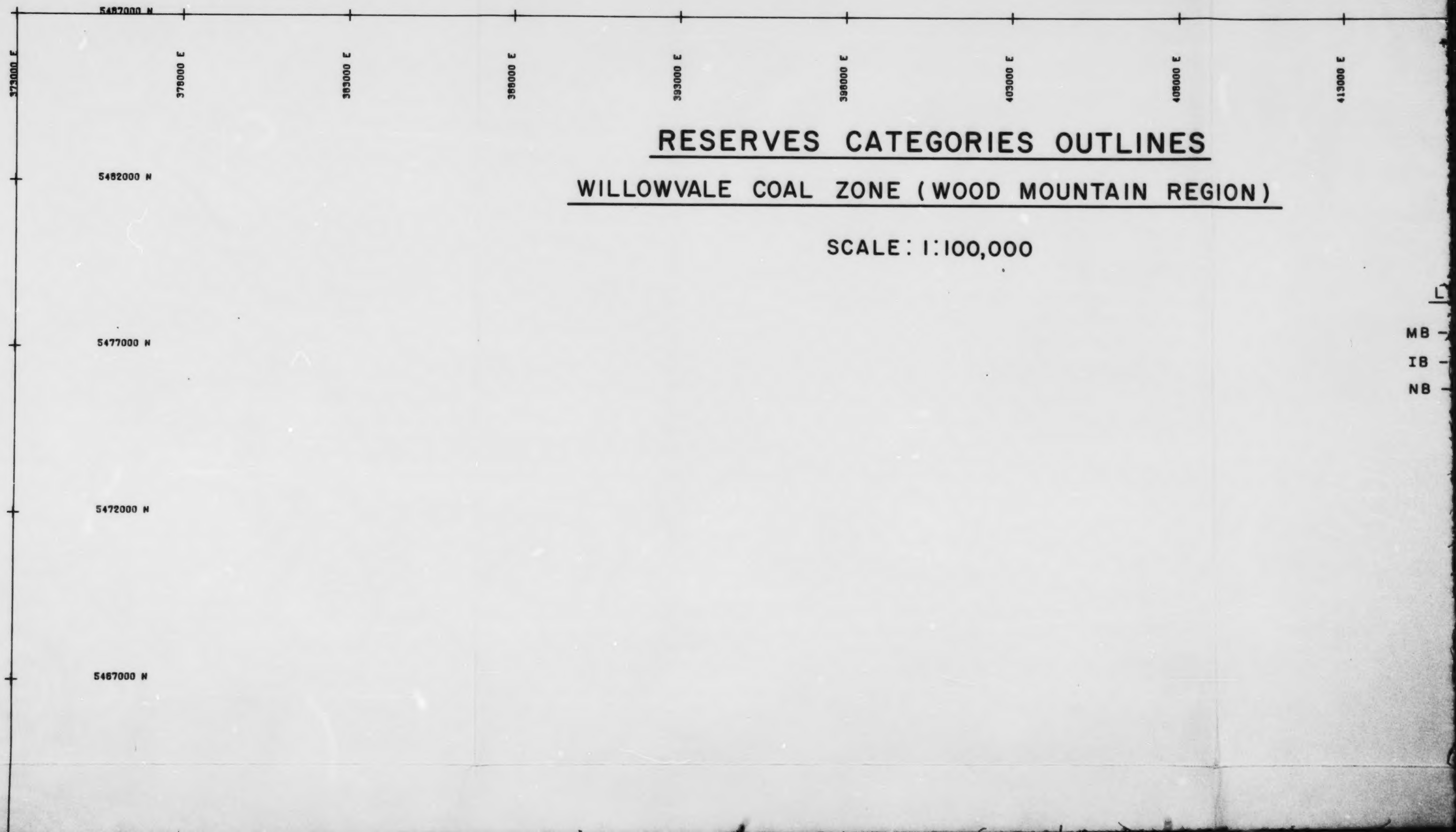
428000 E

RESERVES CATEGORIES OUTLINES

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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388000 E
393000 E
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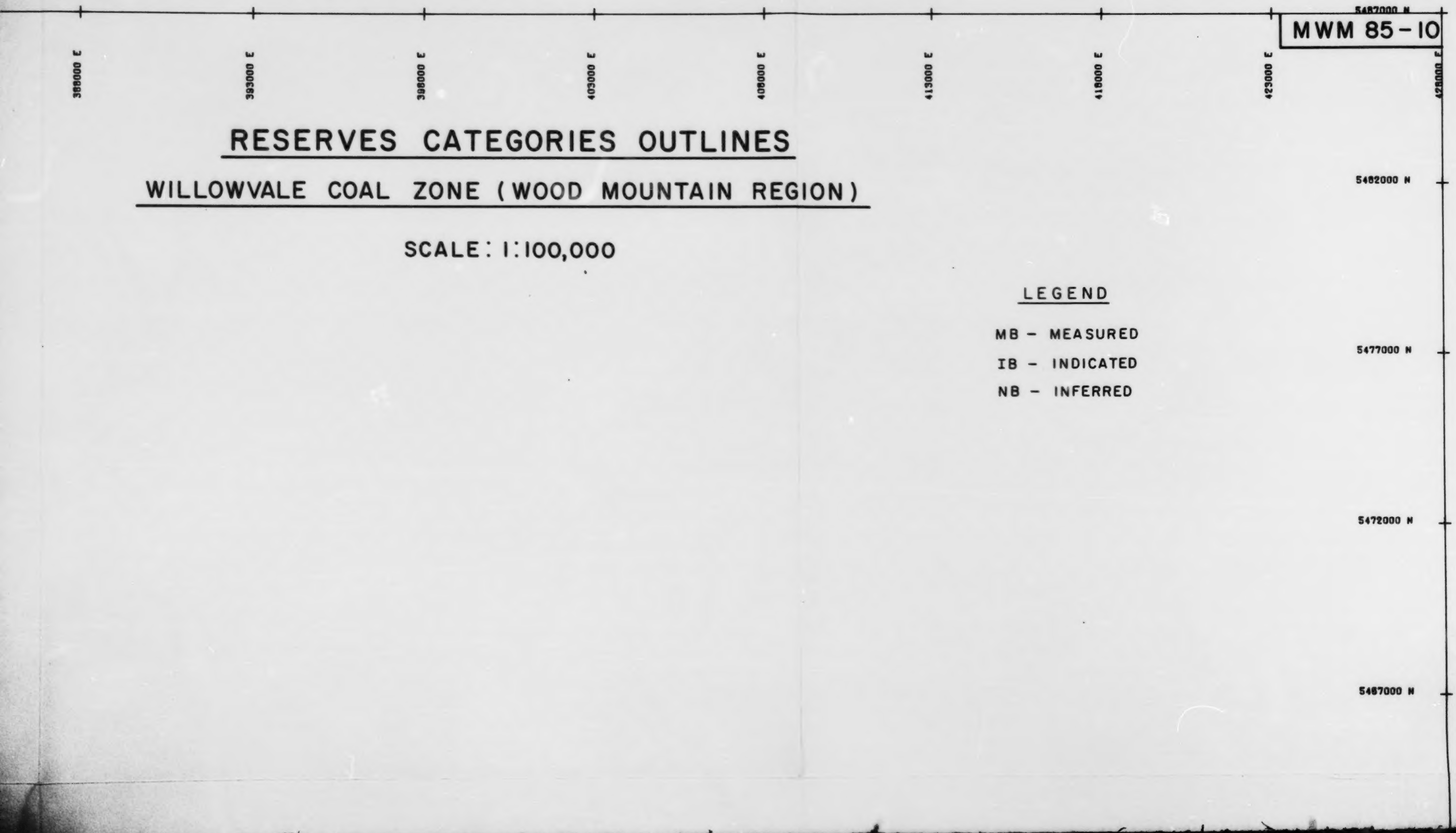
403000 E
408000 E
413000 E
L
MB -
IB -
NB -

MWM 85-10

RESERVES CATEGORIES OUTLINES

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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398000 E
403000 E
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413000 E
418000 E
423000 E
428000 E
5487000 N
5482000 N
5477000 N
5472000 N
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LEGEND

MB - MEASURED
IB - INDICATED
NB - INFERRED

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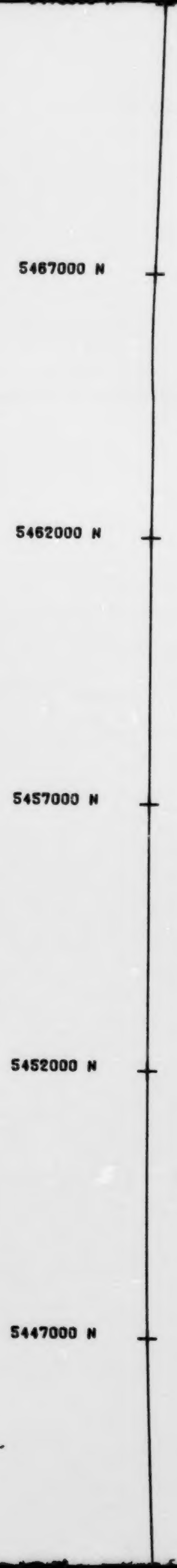
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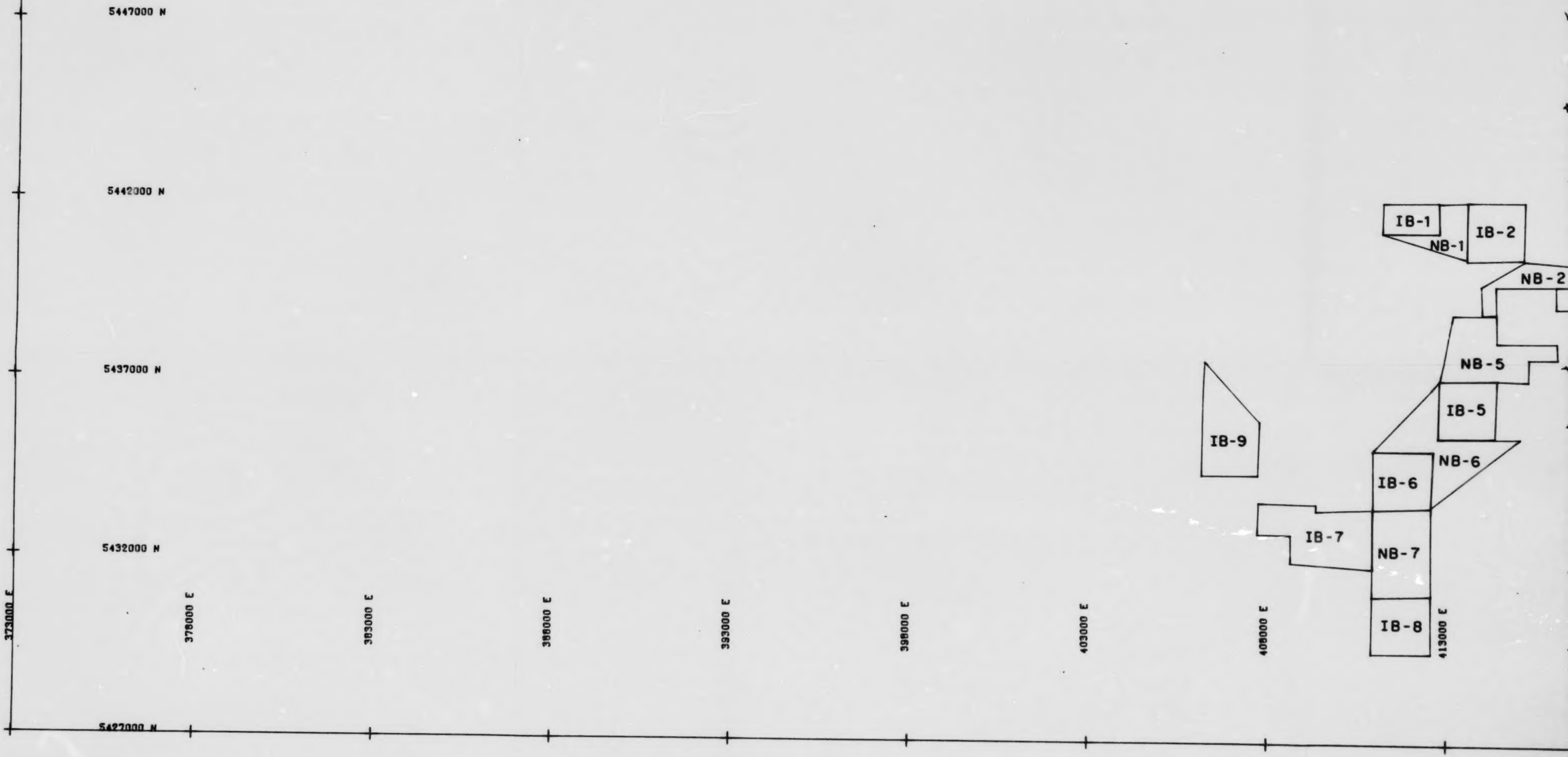
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403000 E
408000 E
413000 E
IB-1
NB-1
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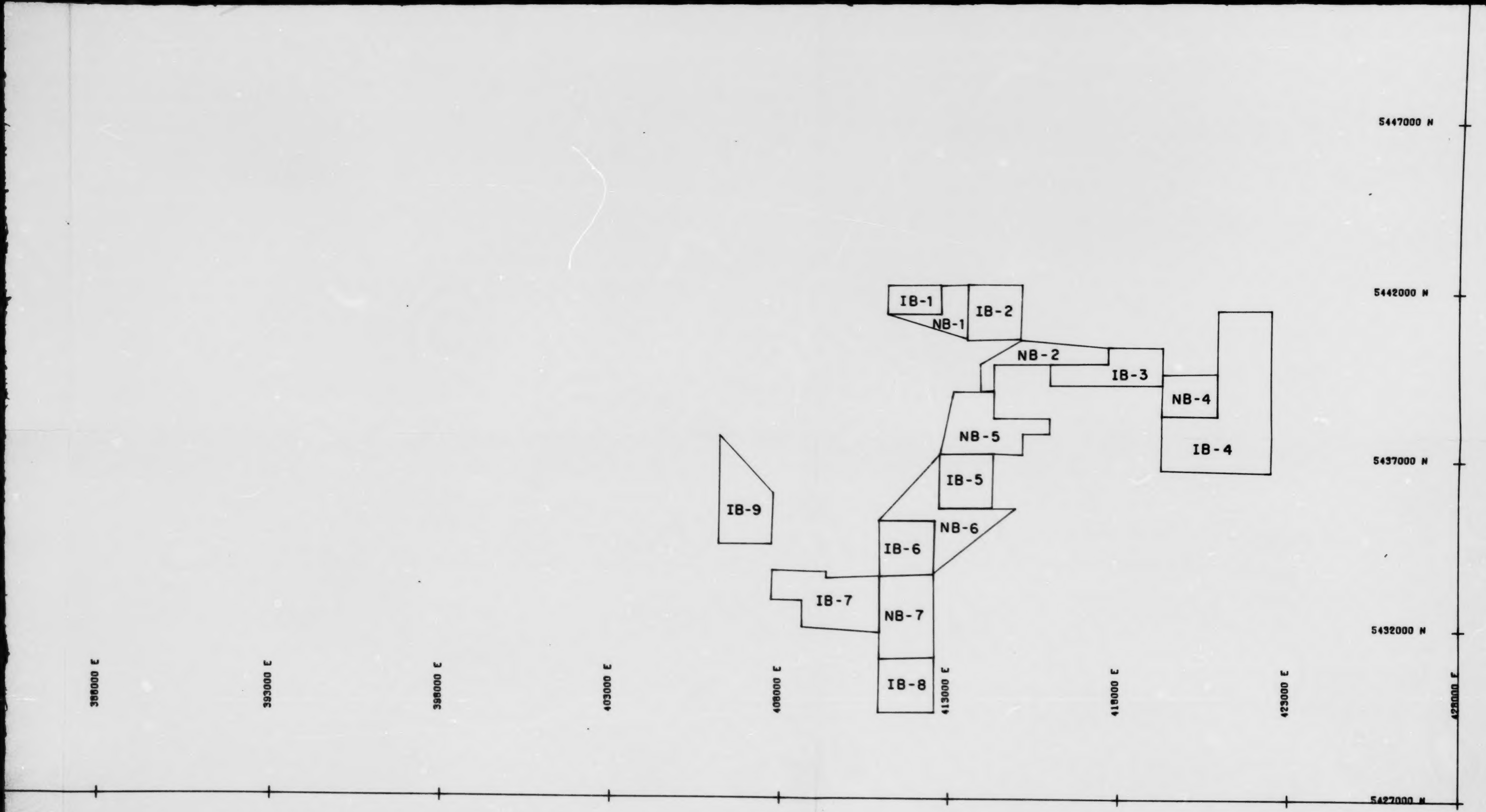
NB-2
NB-5
IB-5
IB-9
NB-6
IB-6
IB-7
NB-7
IB-8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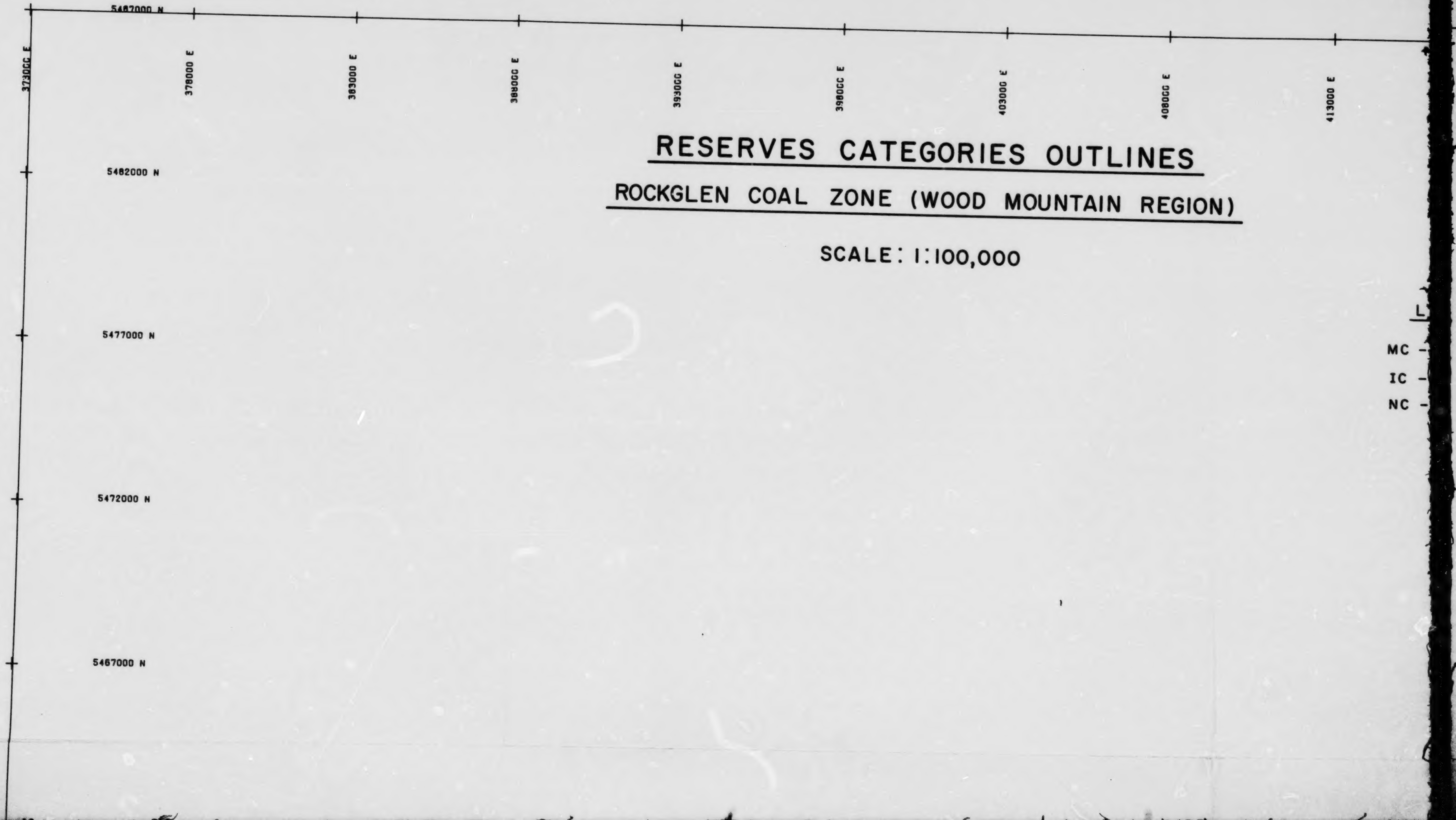
423000 E
428000 E
IB-1
NB-1
IB-2
NB-2
IB-3
NB-4
IB-4
NB-5
IB-5
IB-9
NB-6
IB-6
IB-7
NB-7
IB-8

RESERVES CATEGORIES OUTLINES

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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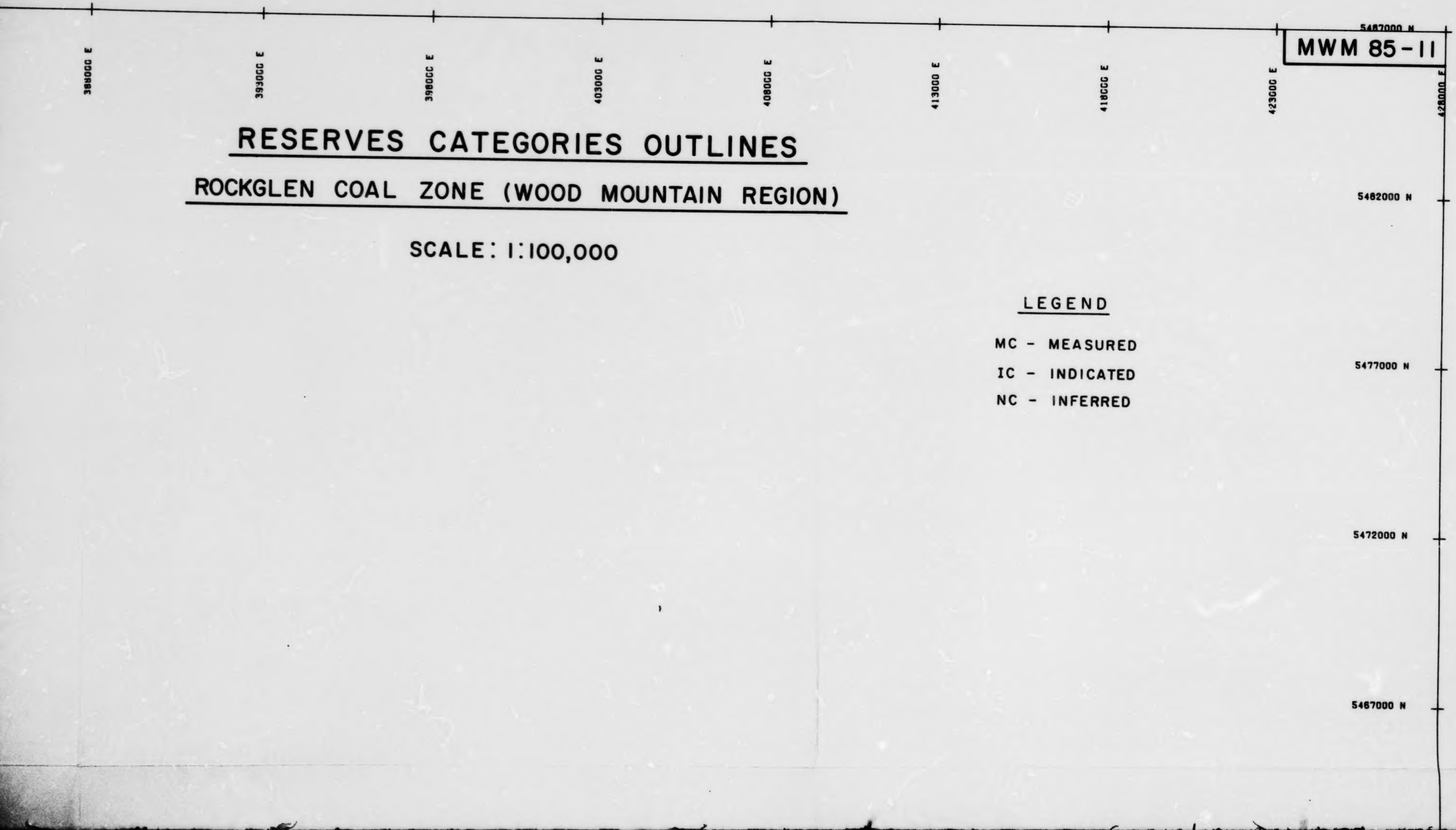
5477000 N
5472000 N
5467000 N
373000 E
378000 E
383000 E
388000 E
393000 E
398000 E
403000 E
408000 E
413000 E
L
MC -
IC -
NC -

MWM 85-11

RESERVES CATEGORIES OUTLINES

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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398000 E
403000 E
408000 E
413000 E
418000 E
423000 E
428000 E
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5477000 N
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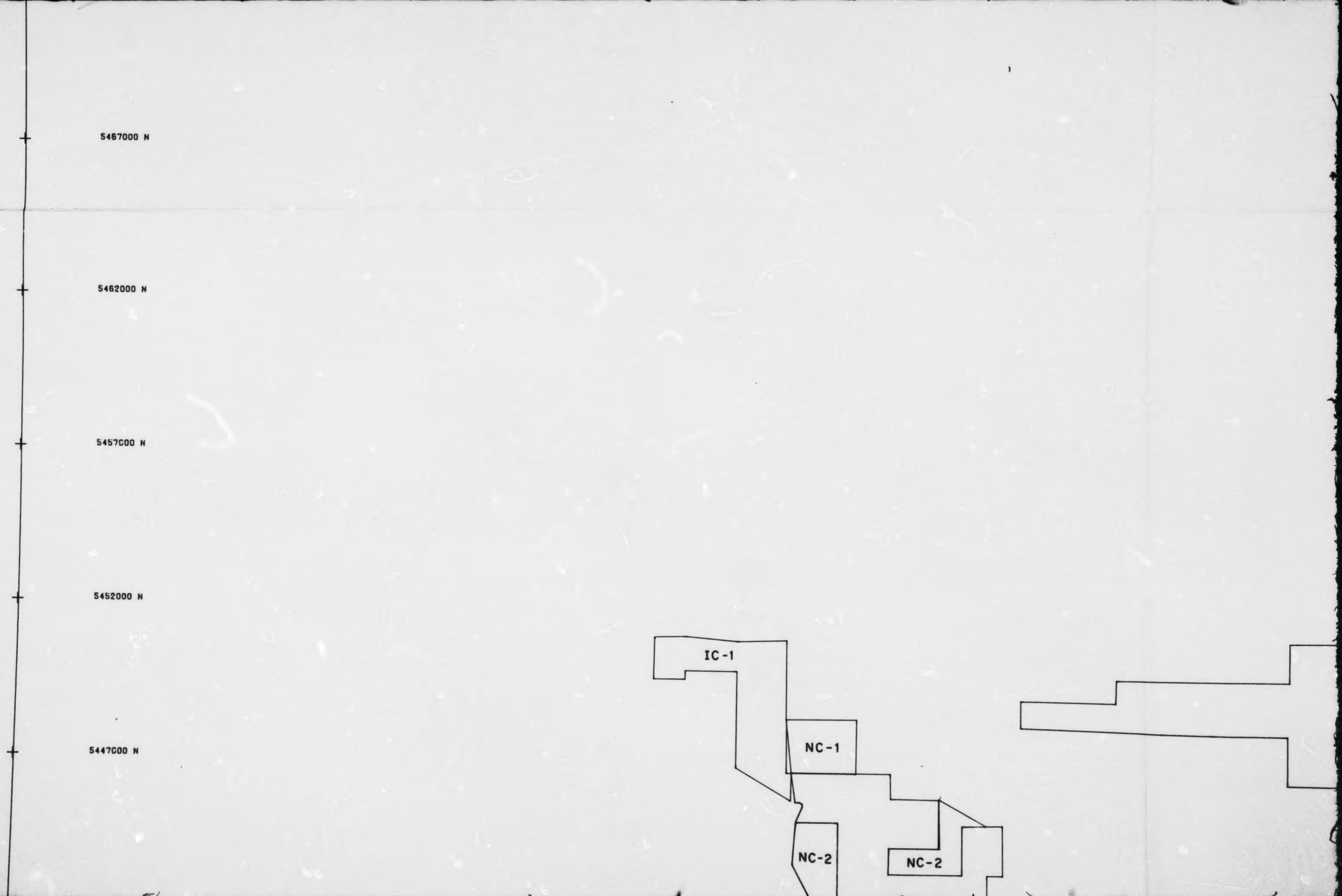
5467000 N

LEGEND

MC - MEASURED
IC - INDICATED
NC - INFERRED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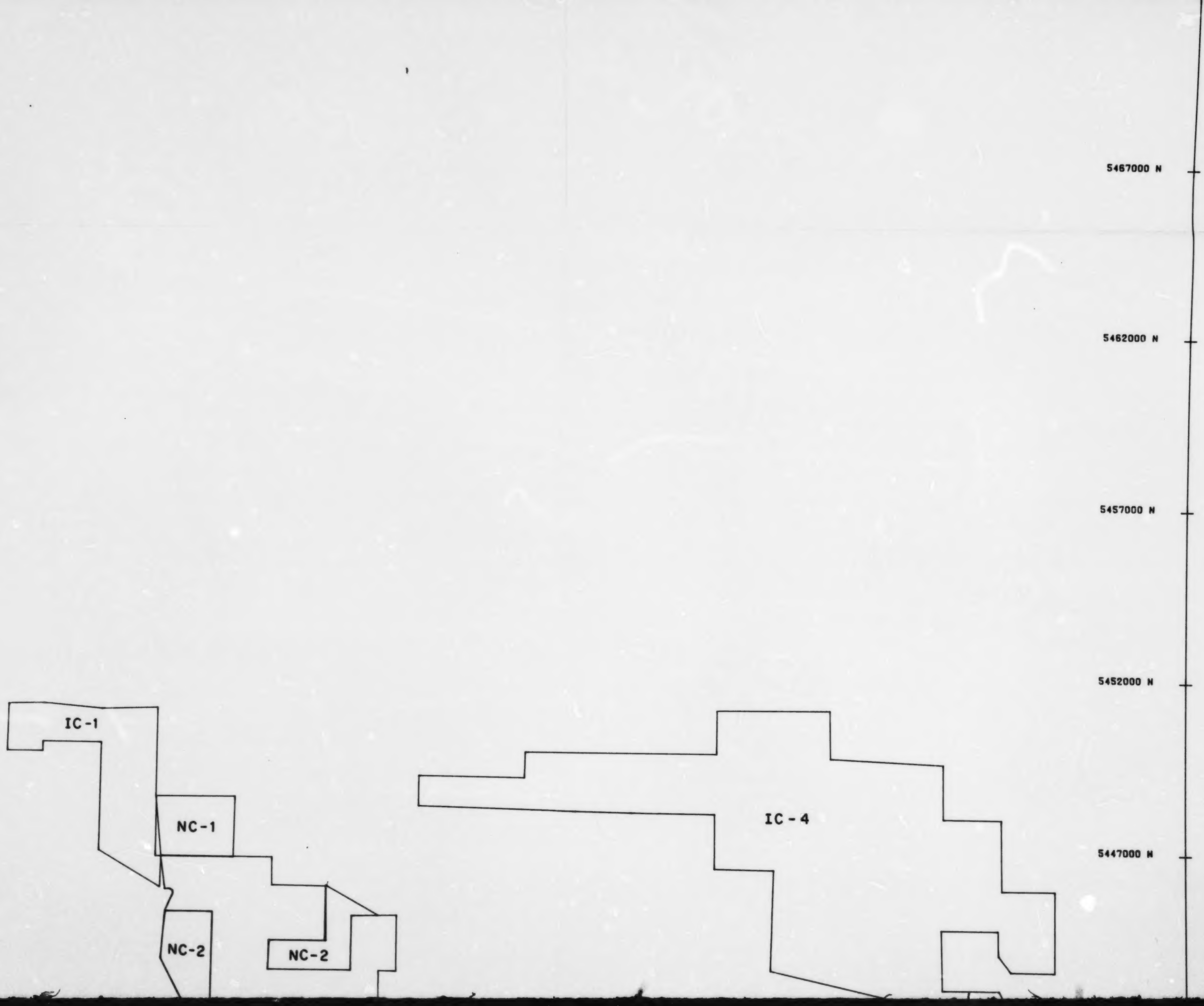
NC-1
NC-2
NC-2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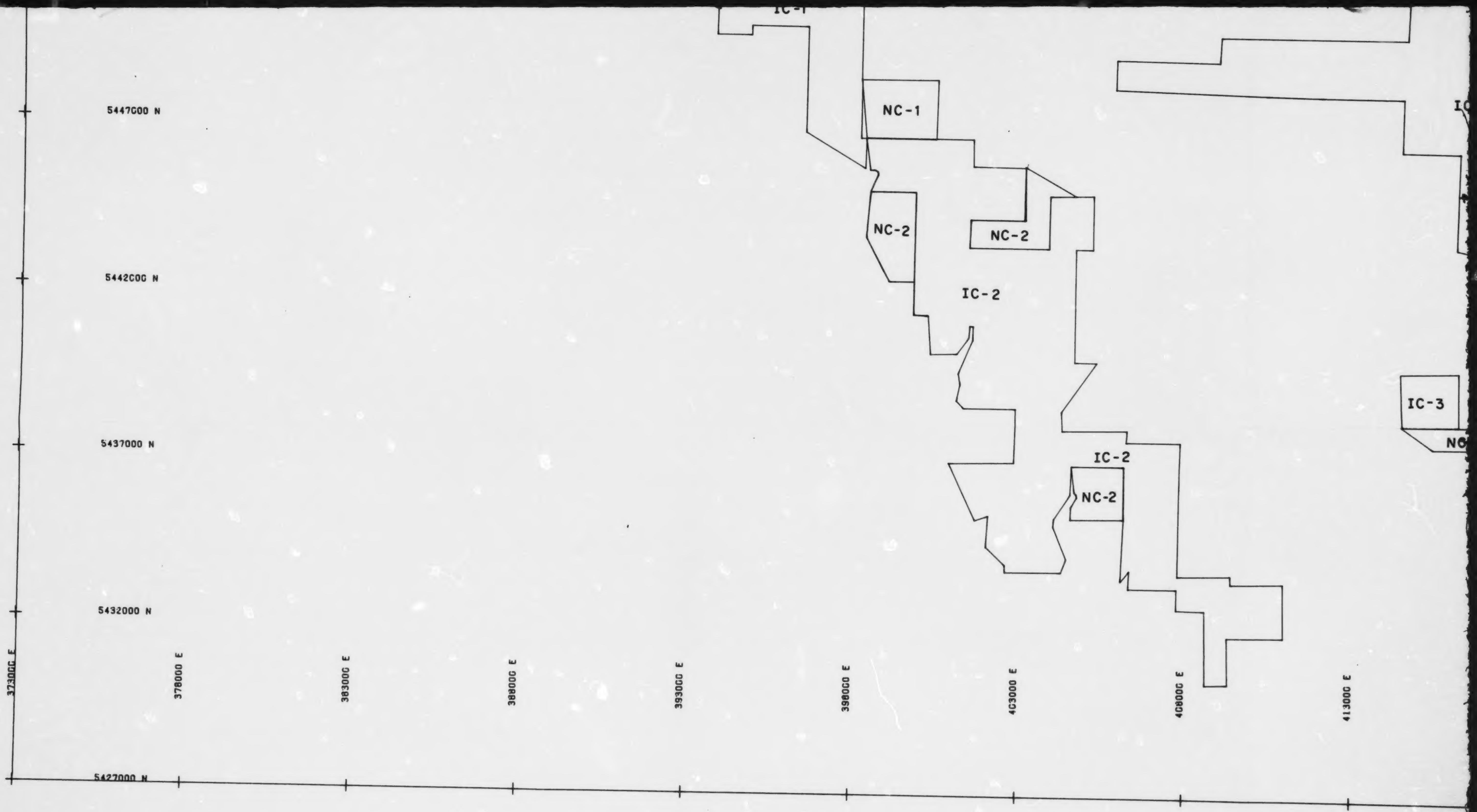
IC-1
NC-1
NC-2
NC-2
IC-4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NC-1
IC
NC-2
NC-2
IC-2
IC-3
NC
IC-2
NC-2
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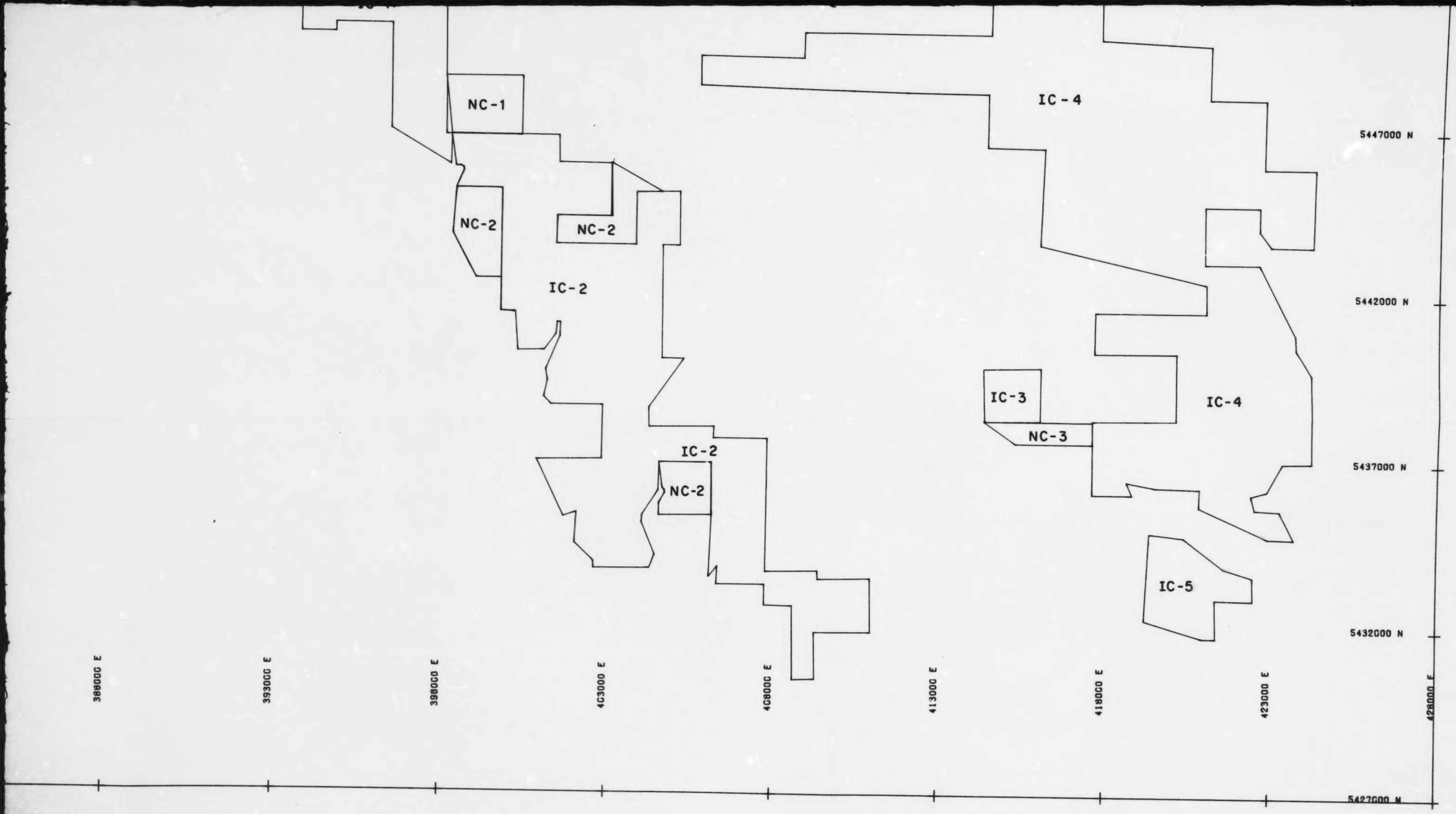

NC-1
NC-2
NC-2
IC-2
IC-2
NC-2
IC-4
IC-3
NC-3
IC-4
IC-5
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5442000 N
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5432000 N
5427000 N
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393000 E
398000 E
403000 E
408000 E
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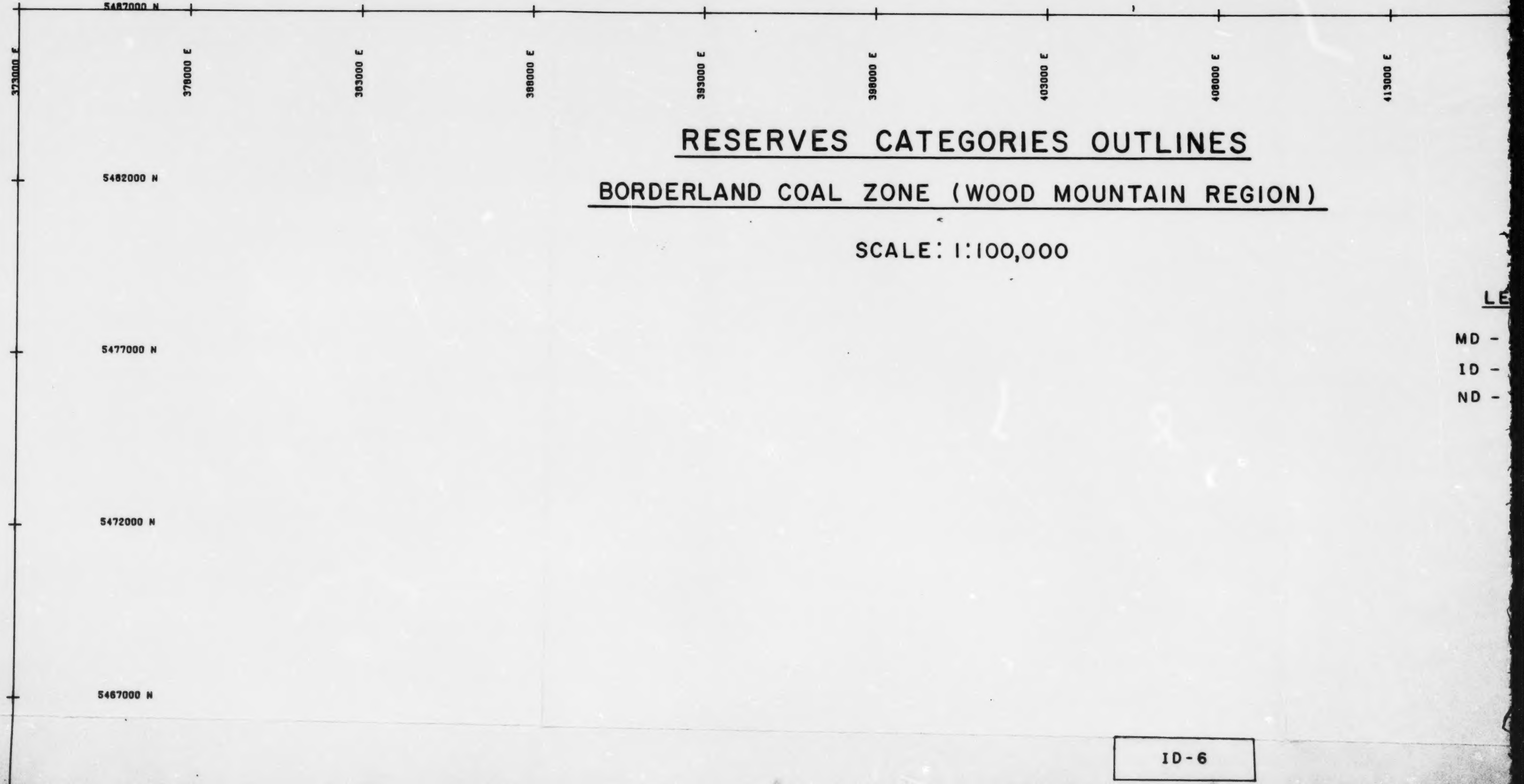
RESERVES CATEGORIES OUTLINES

BORDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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5472000 N
5467000 N
373000 E
378000 E
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388000 E
393000 E
398000 E
403000 E
408000 E
413000 E

LE

MD -

ID -

ND -

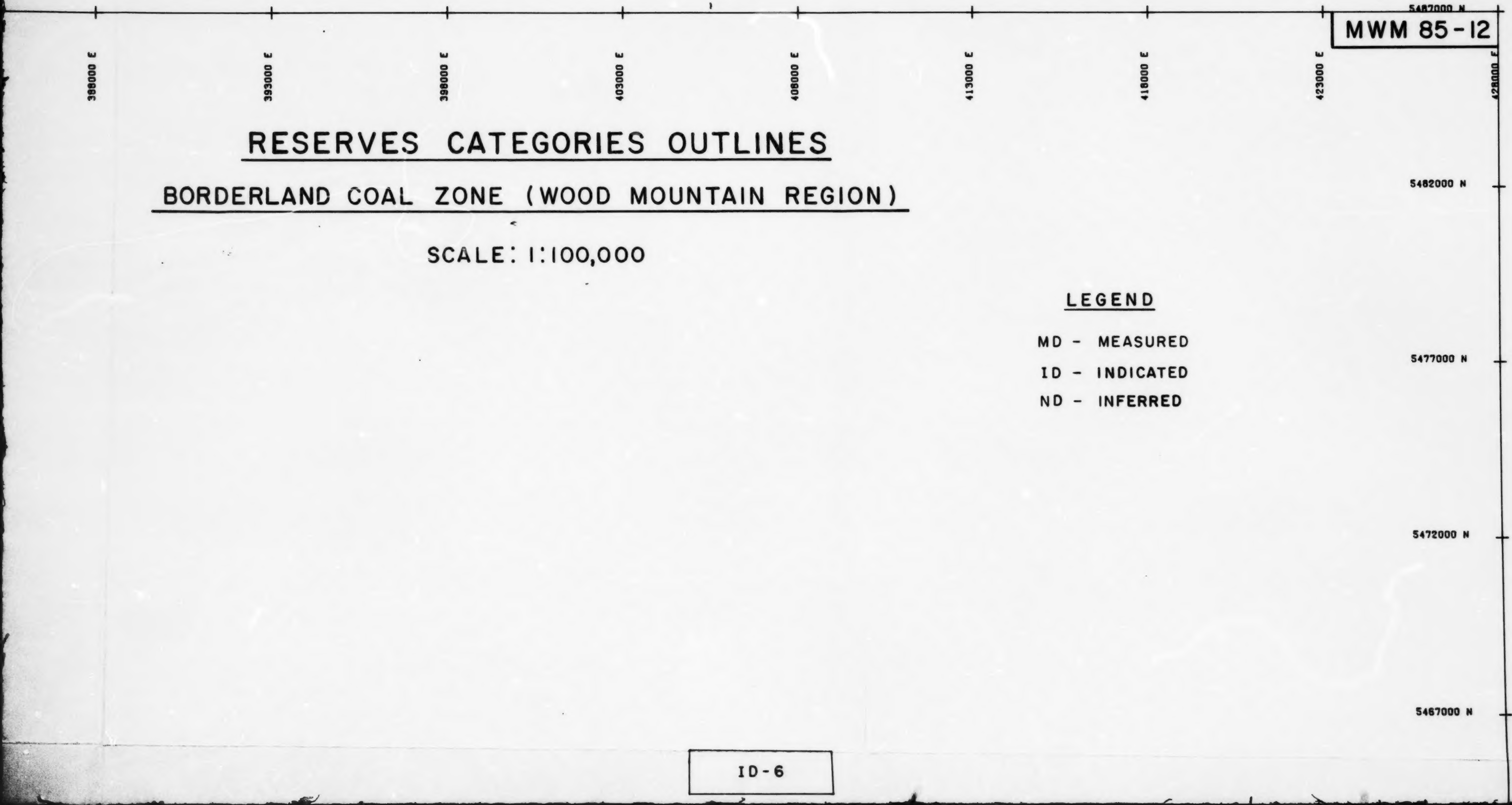
ID-6

MWM 85-12

RESERVES CATEGORIES OUTLINES

BORDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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398000 E
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408000 E
413000 E
418000 E
423000 E
428000 E
5487000 N
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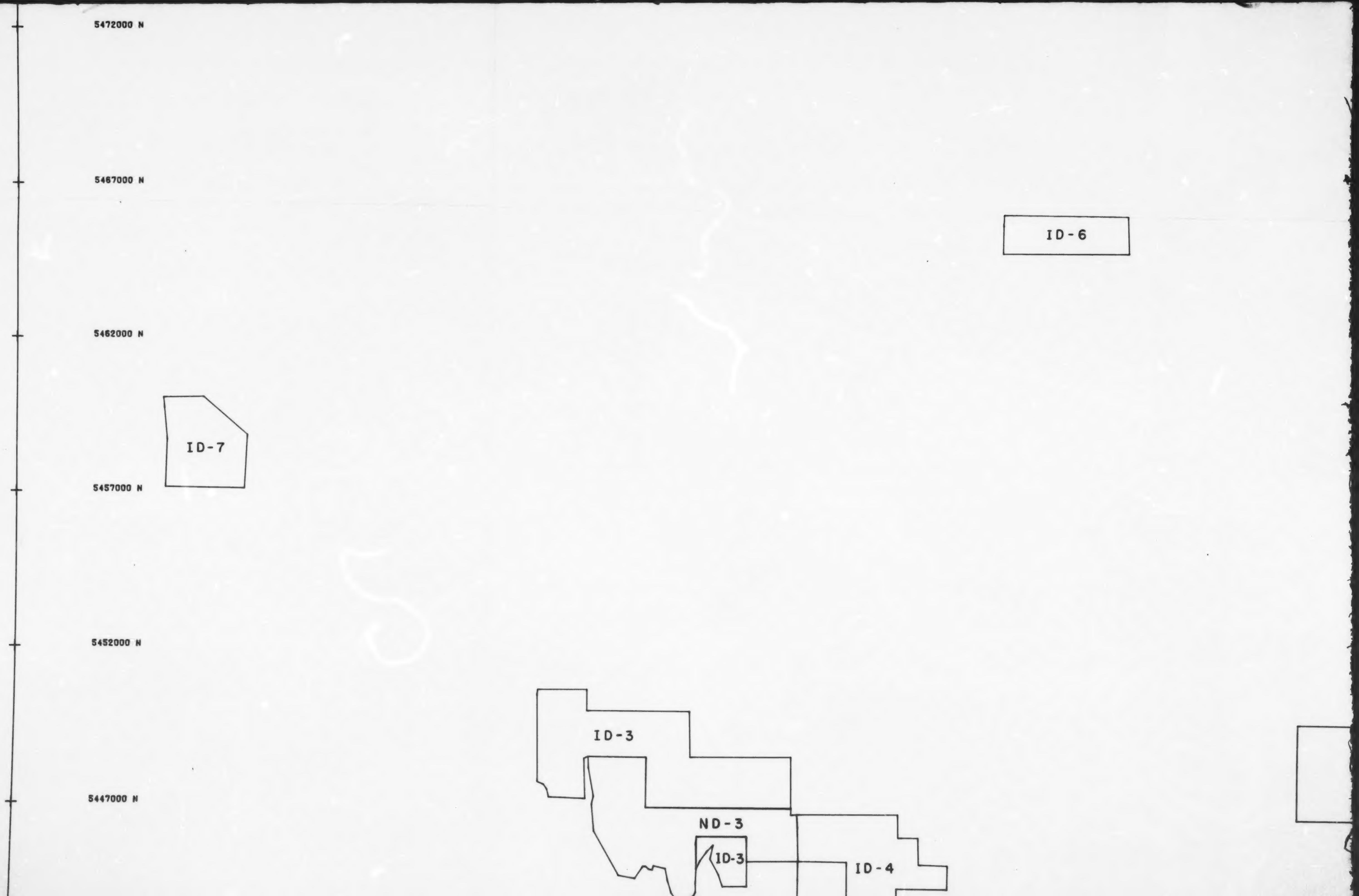
5472000 N
5467000 N

LEGEND

MD - MEASURED
ID - INDICATED
ND - INFERRED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ID-3
ND-3
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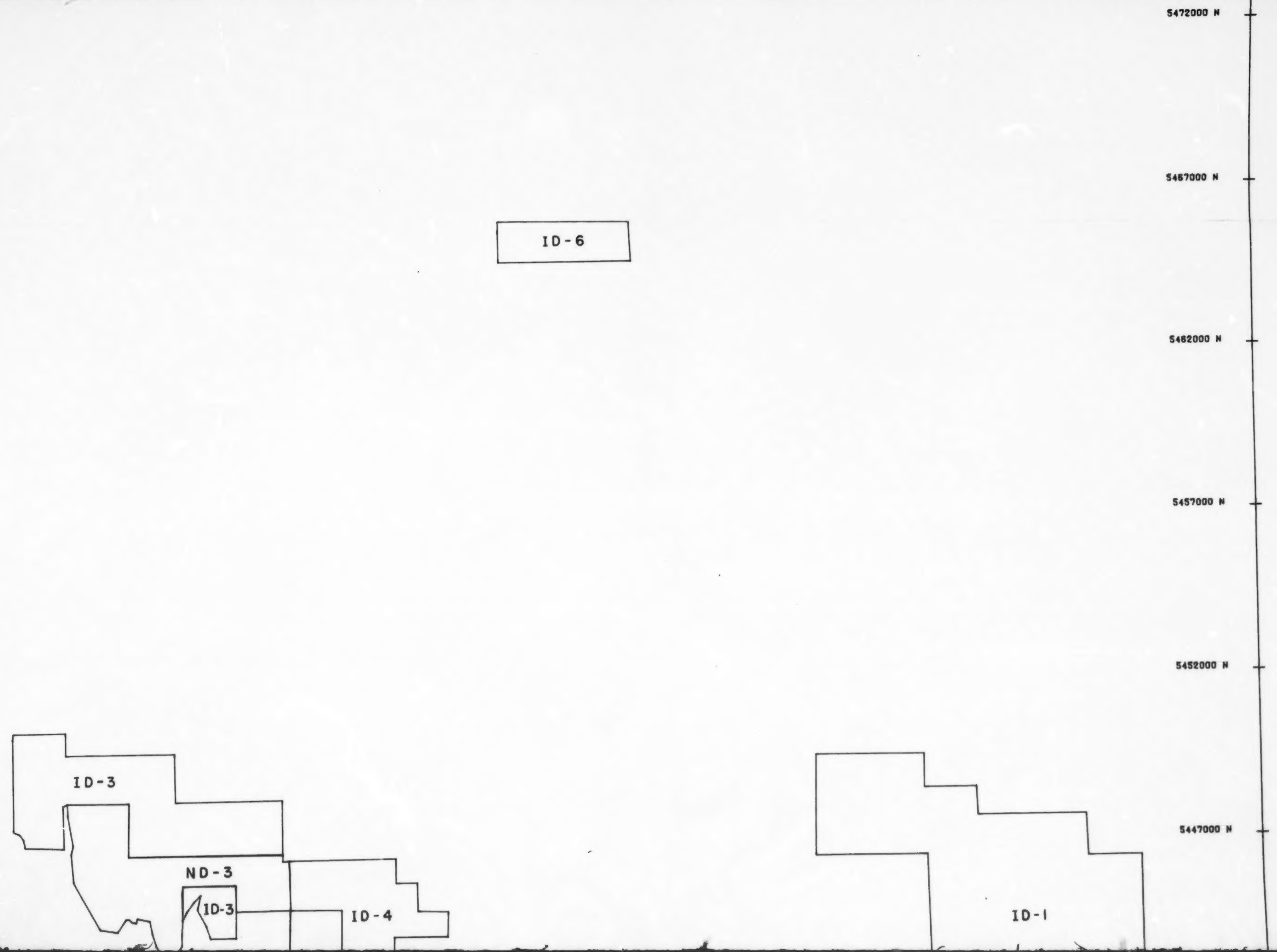
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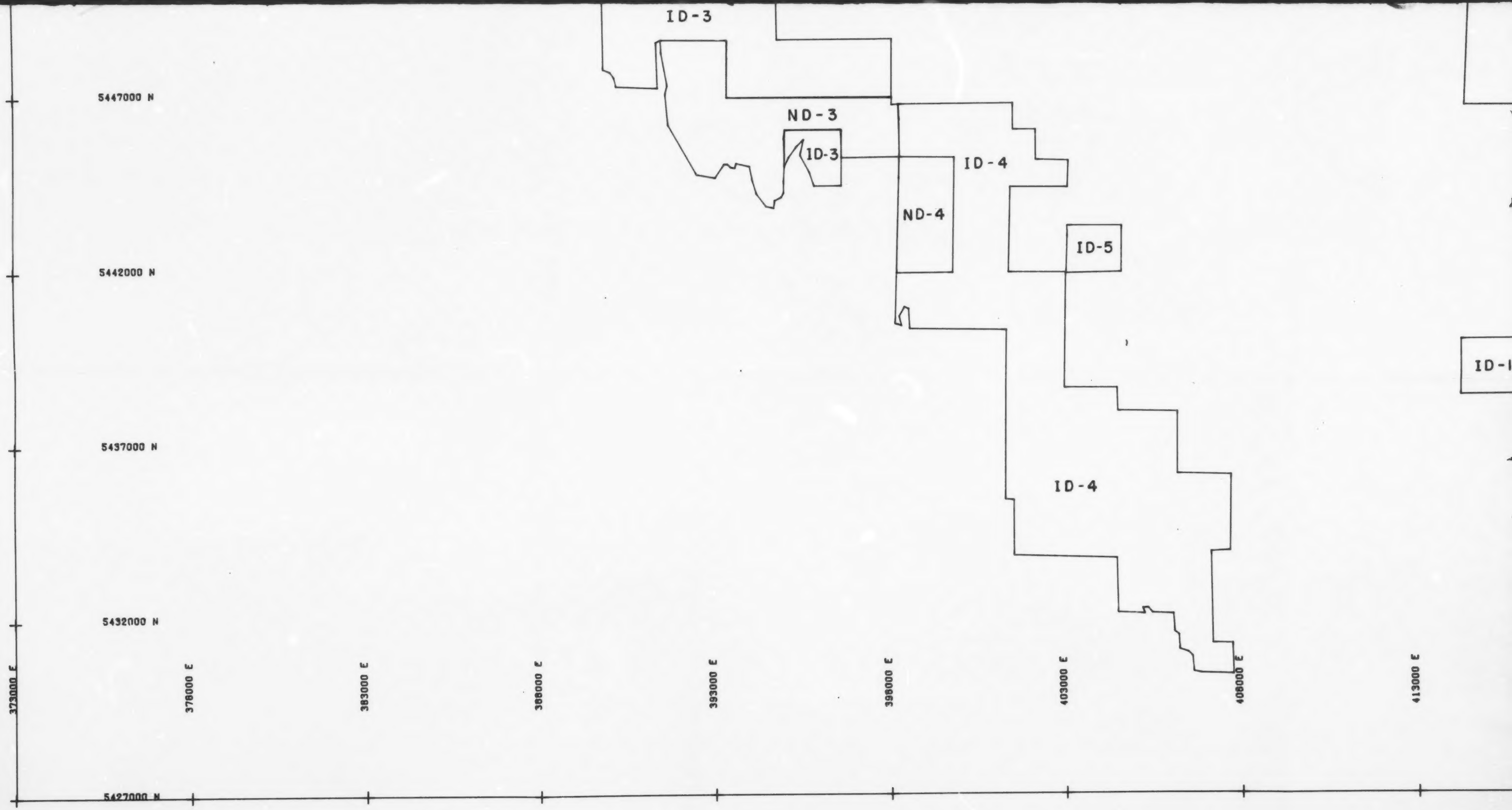
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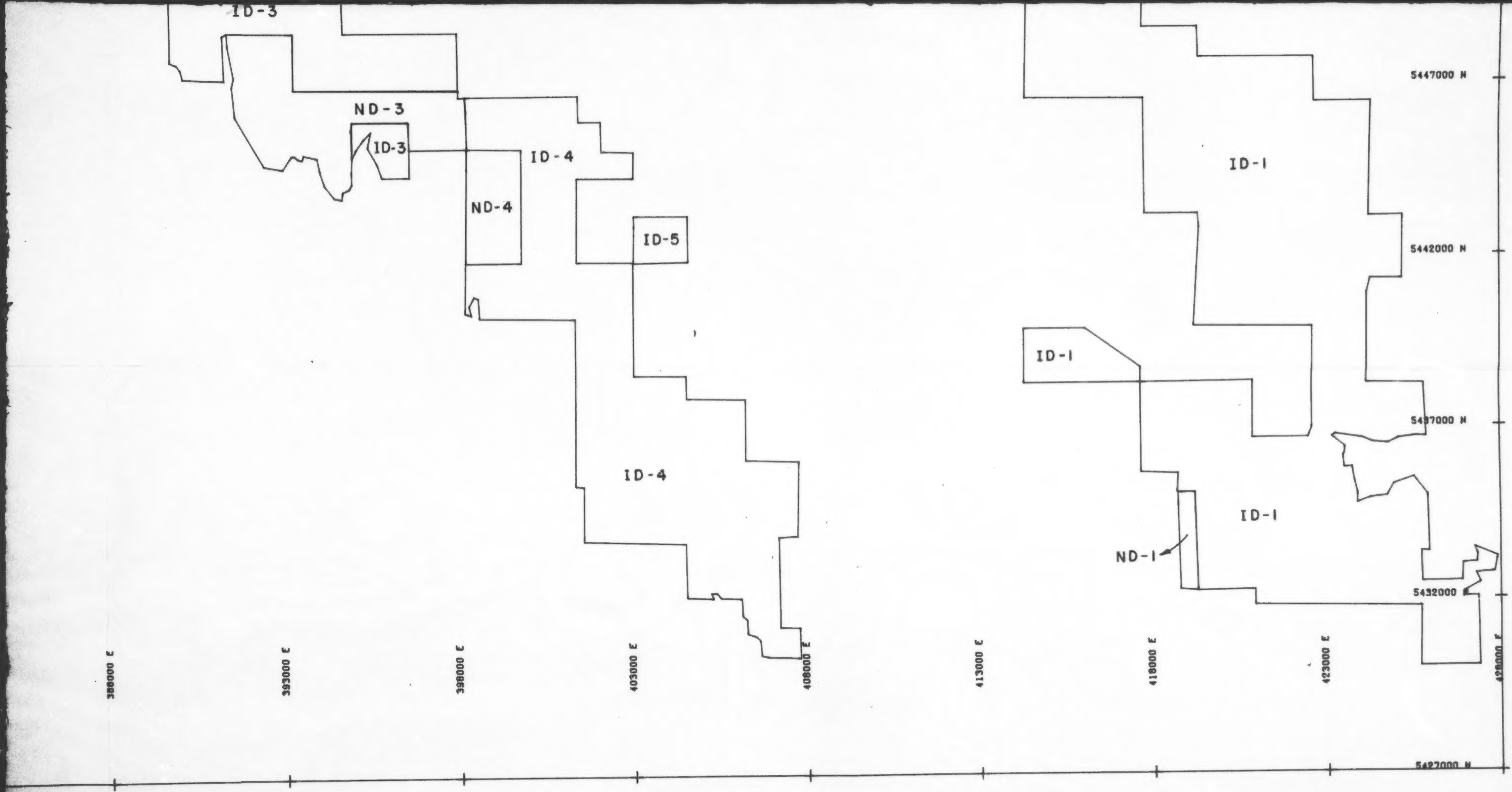
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398000 E
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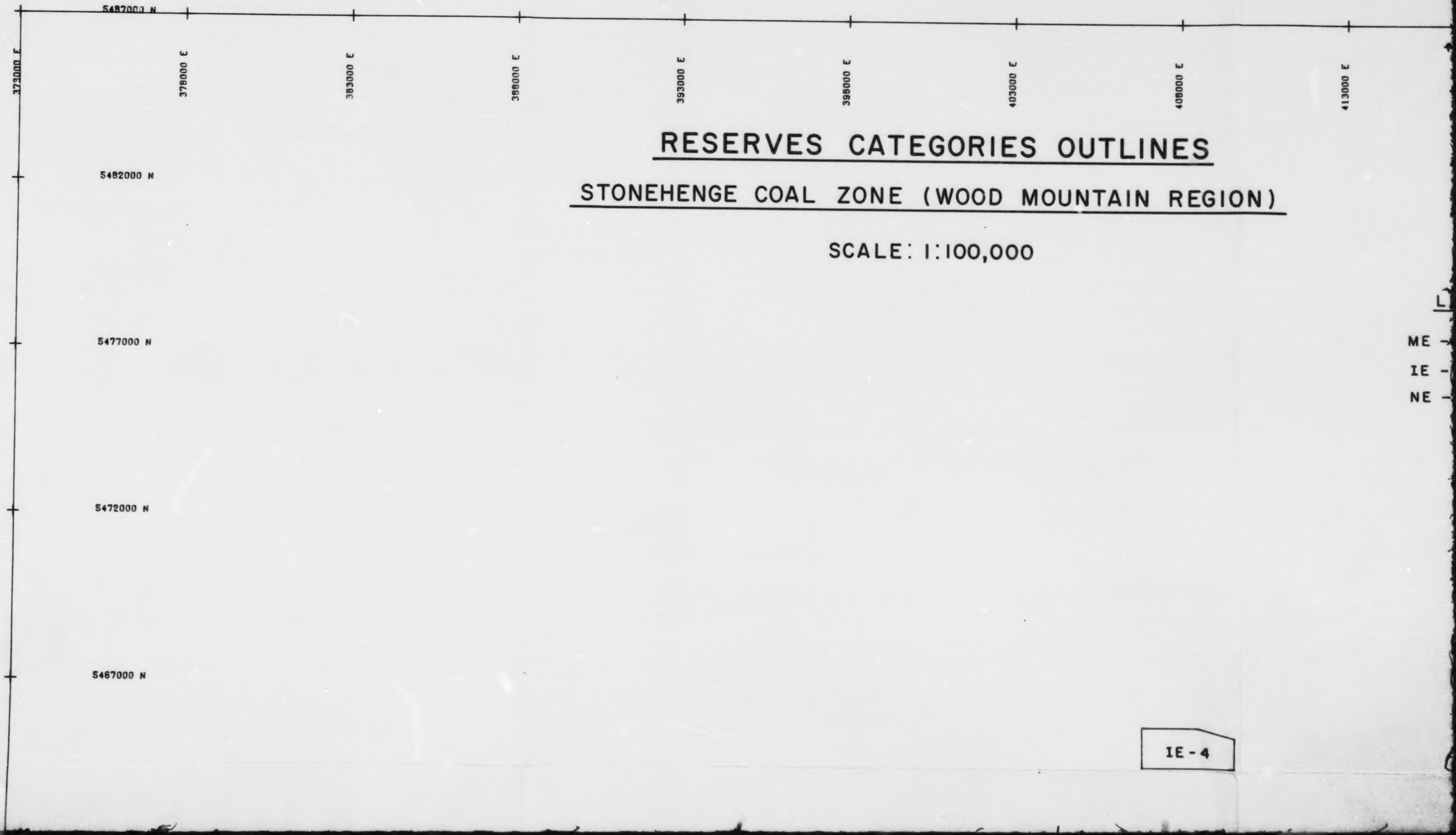
RESERVES CATEGORIES OUTLINES

STONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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408000 E
413000 E
L
ME -
IE -
NE -

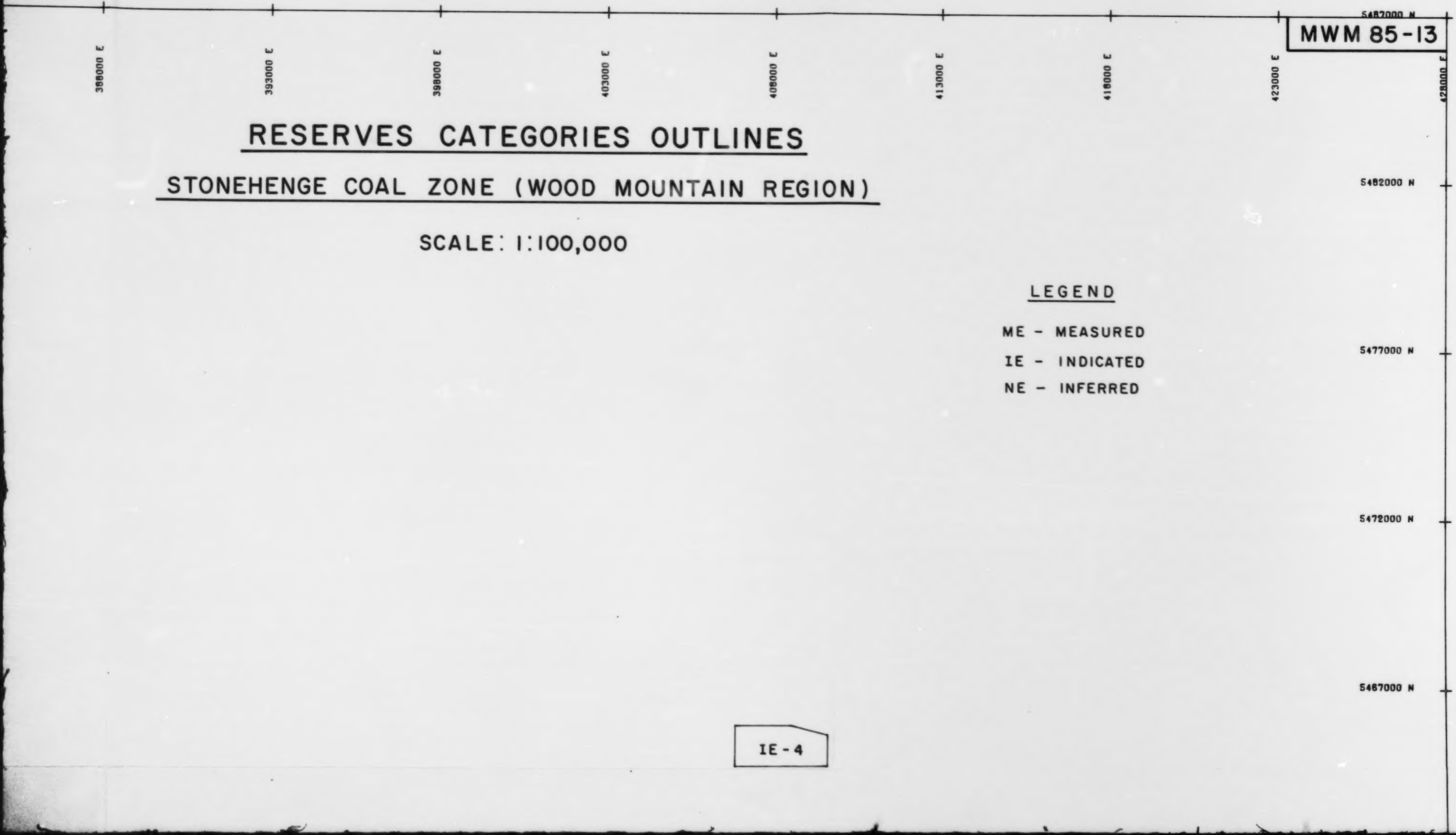
IE - 4

MWM 85-13

RESERVES CATEGORIES OUTLINES

STONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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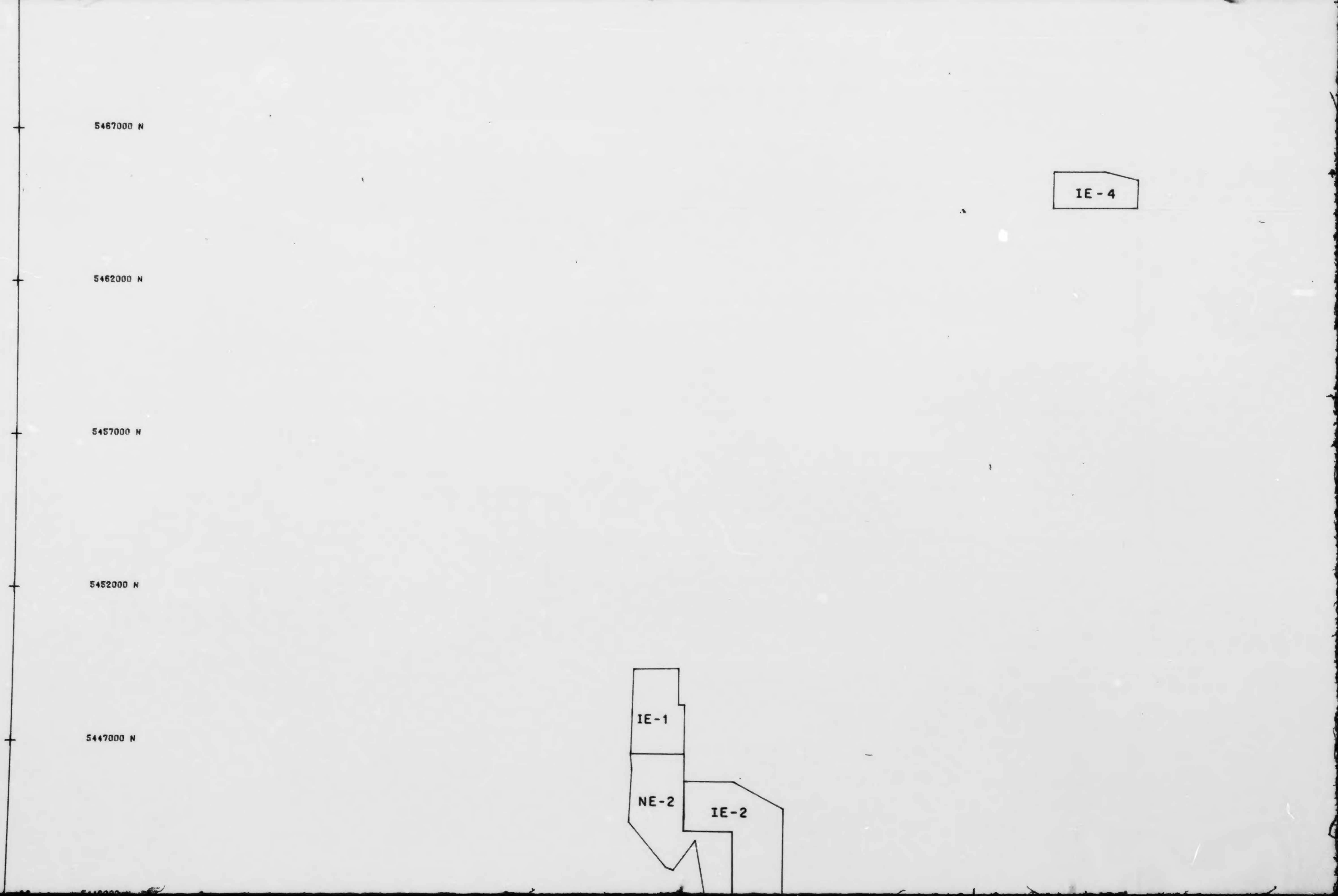
LEGEND

ME - MEASURED

IE - INDICATED

NE - INFERRED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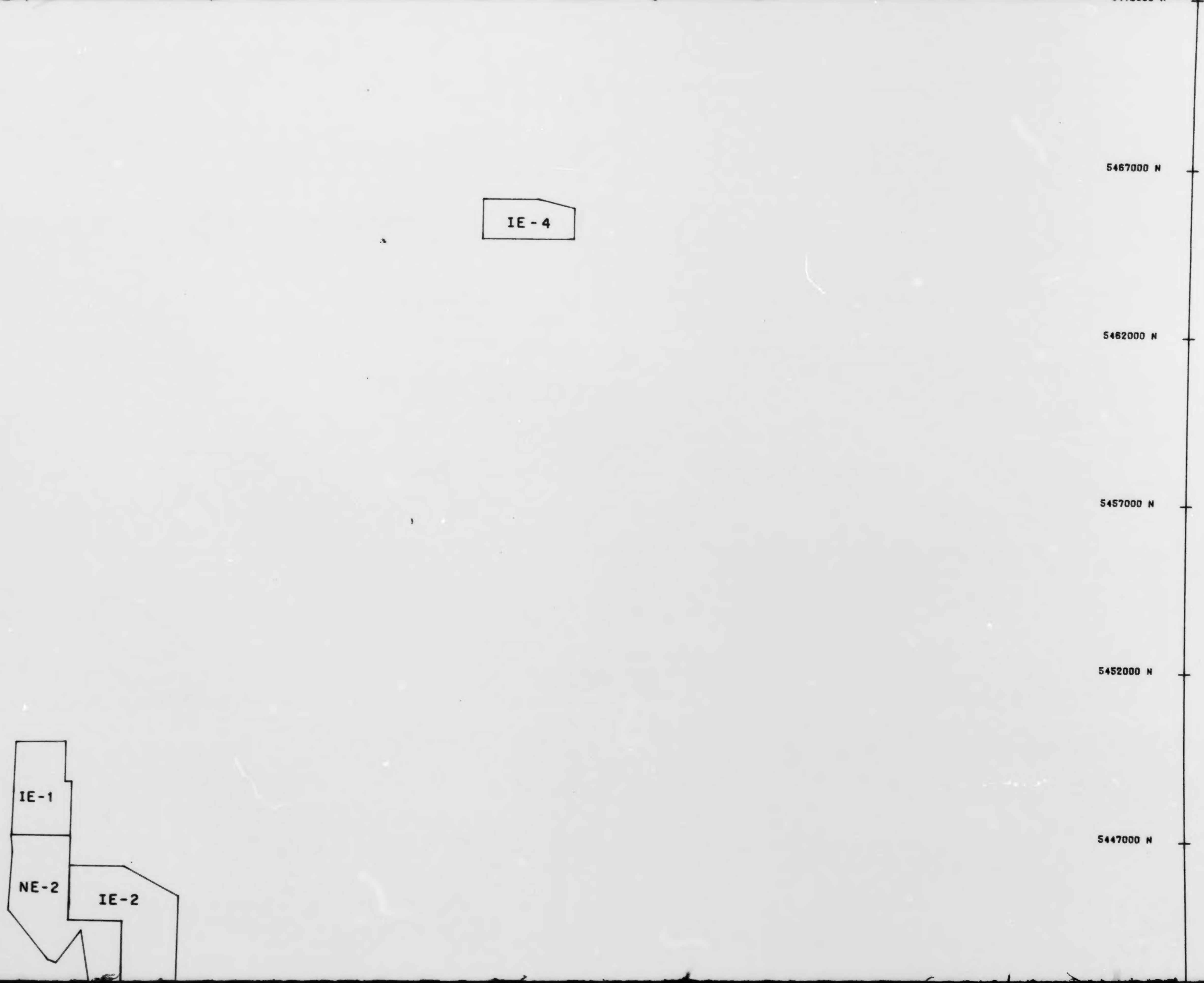
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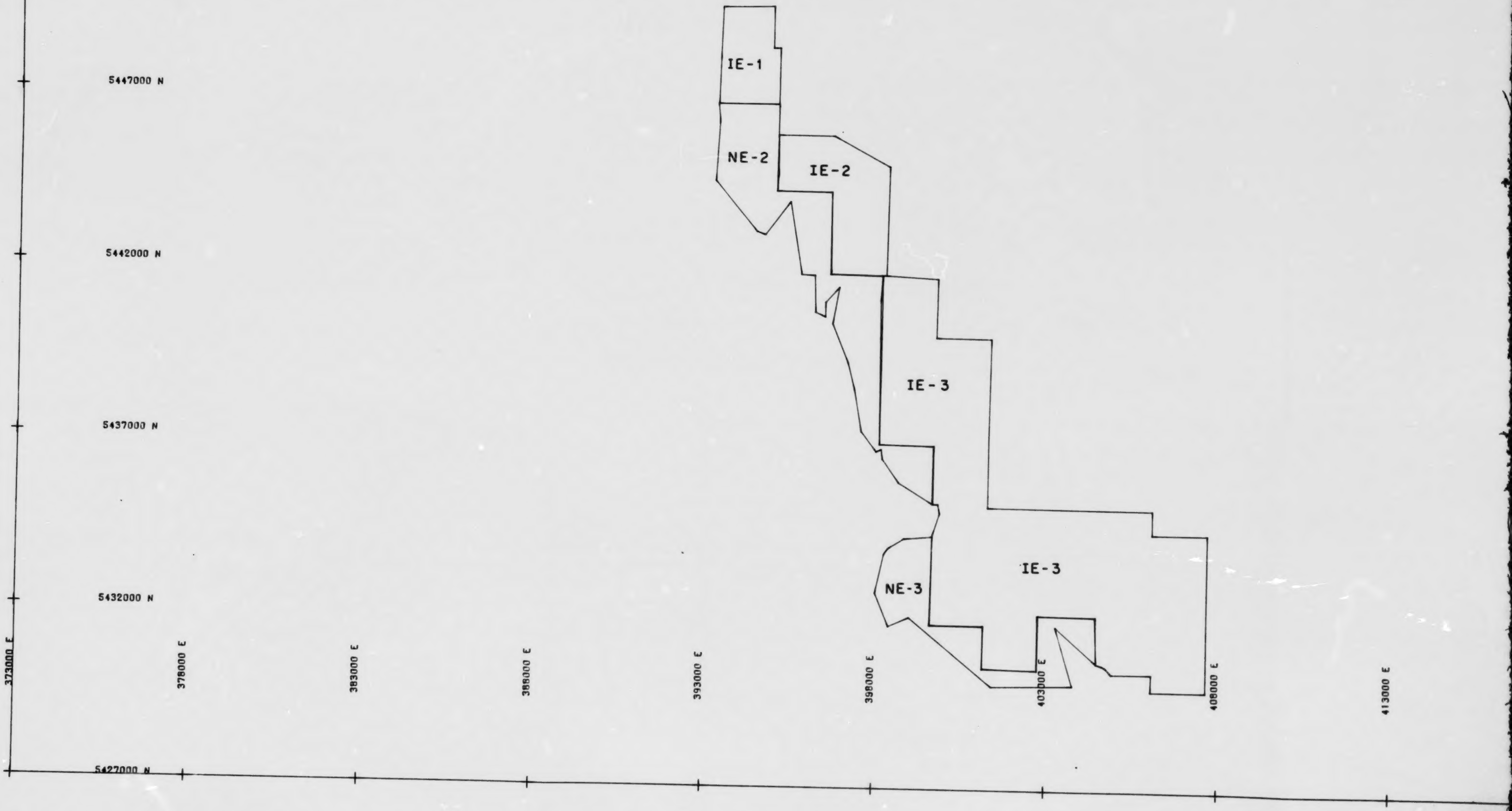
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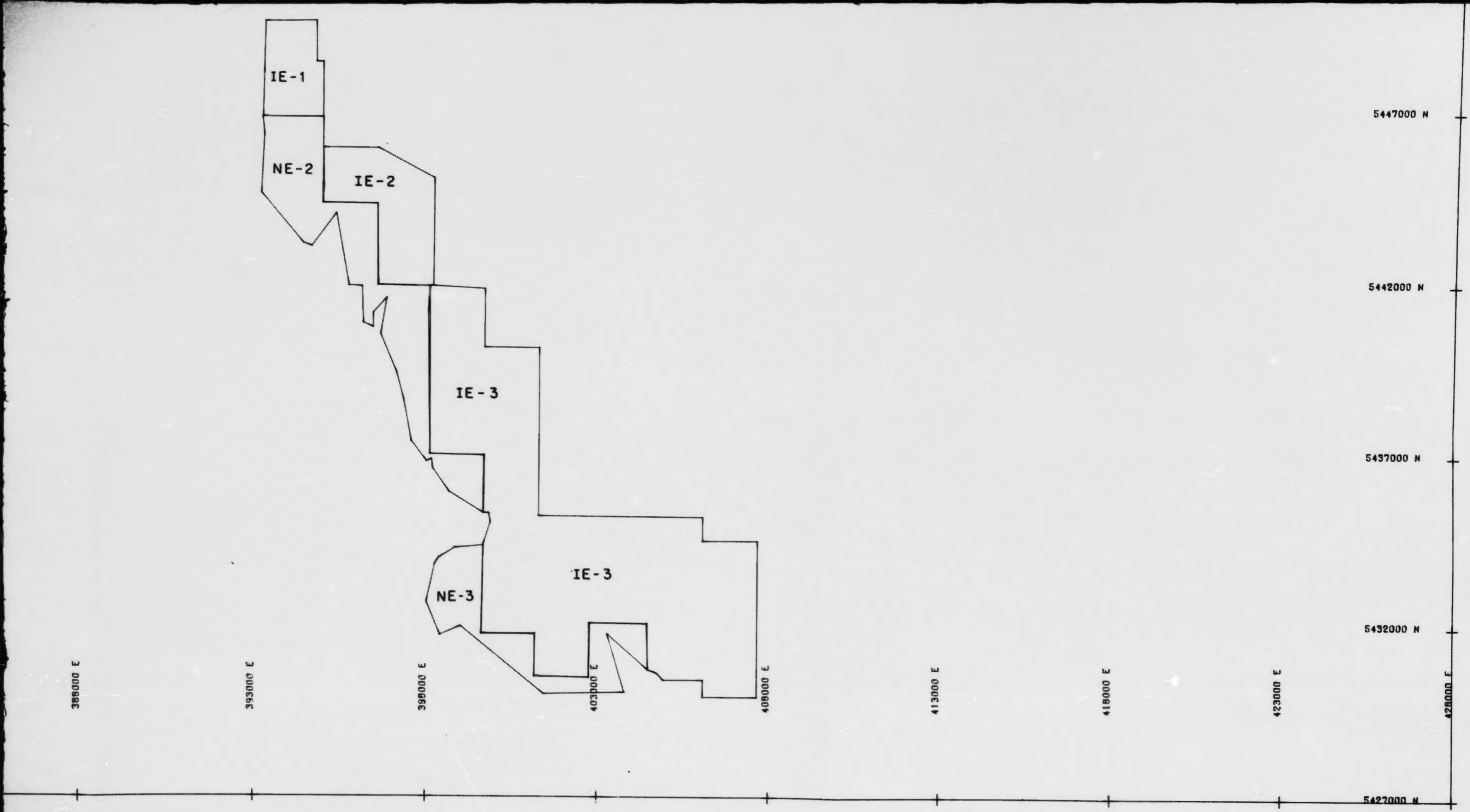
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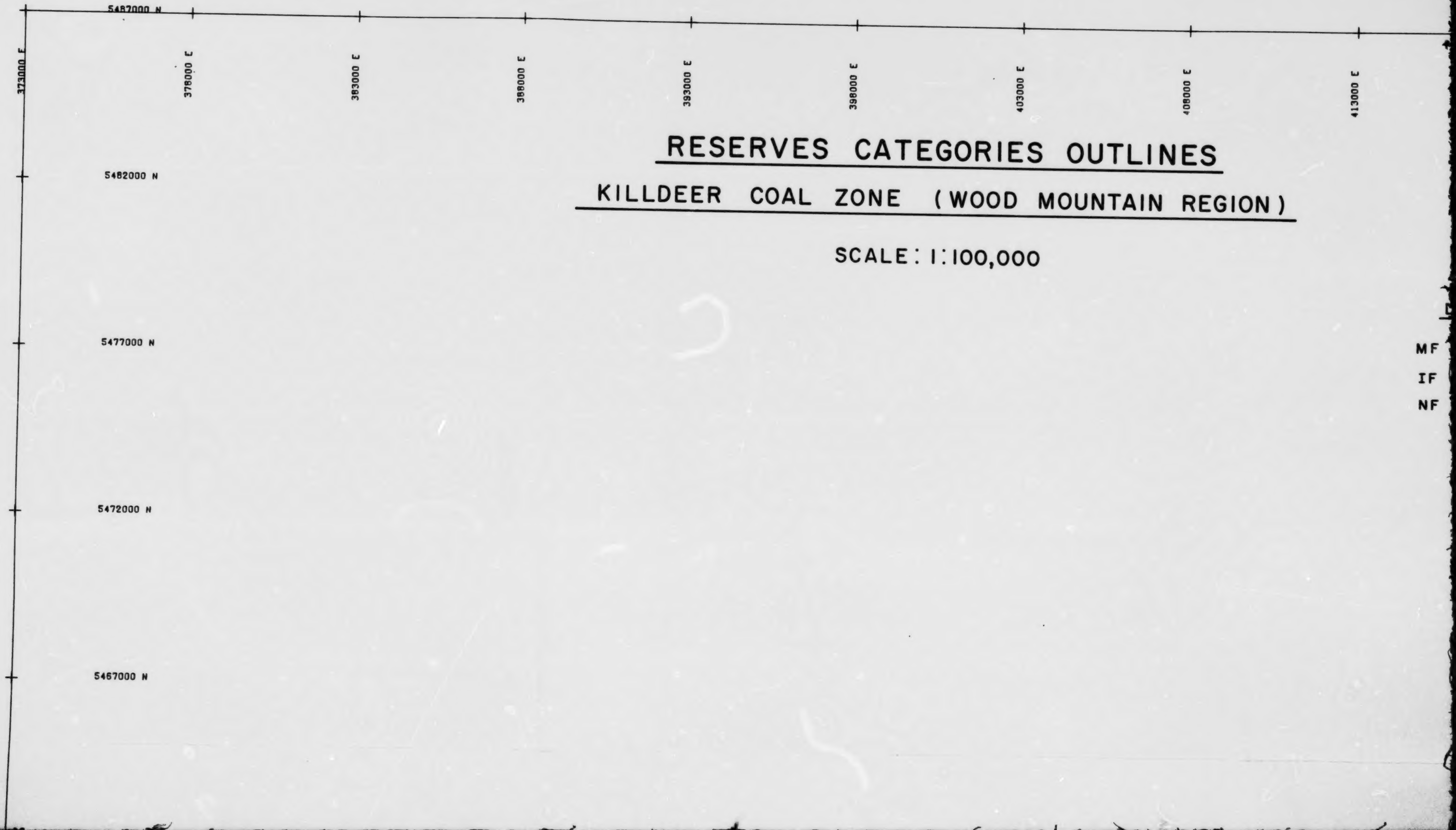
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IF
NF

RESERVES CATEGORIES OUTLINES

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

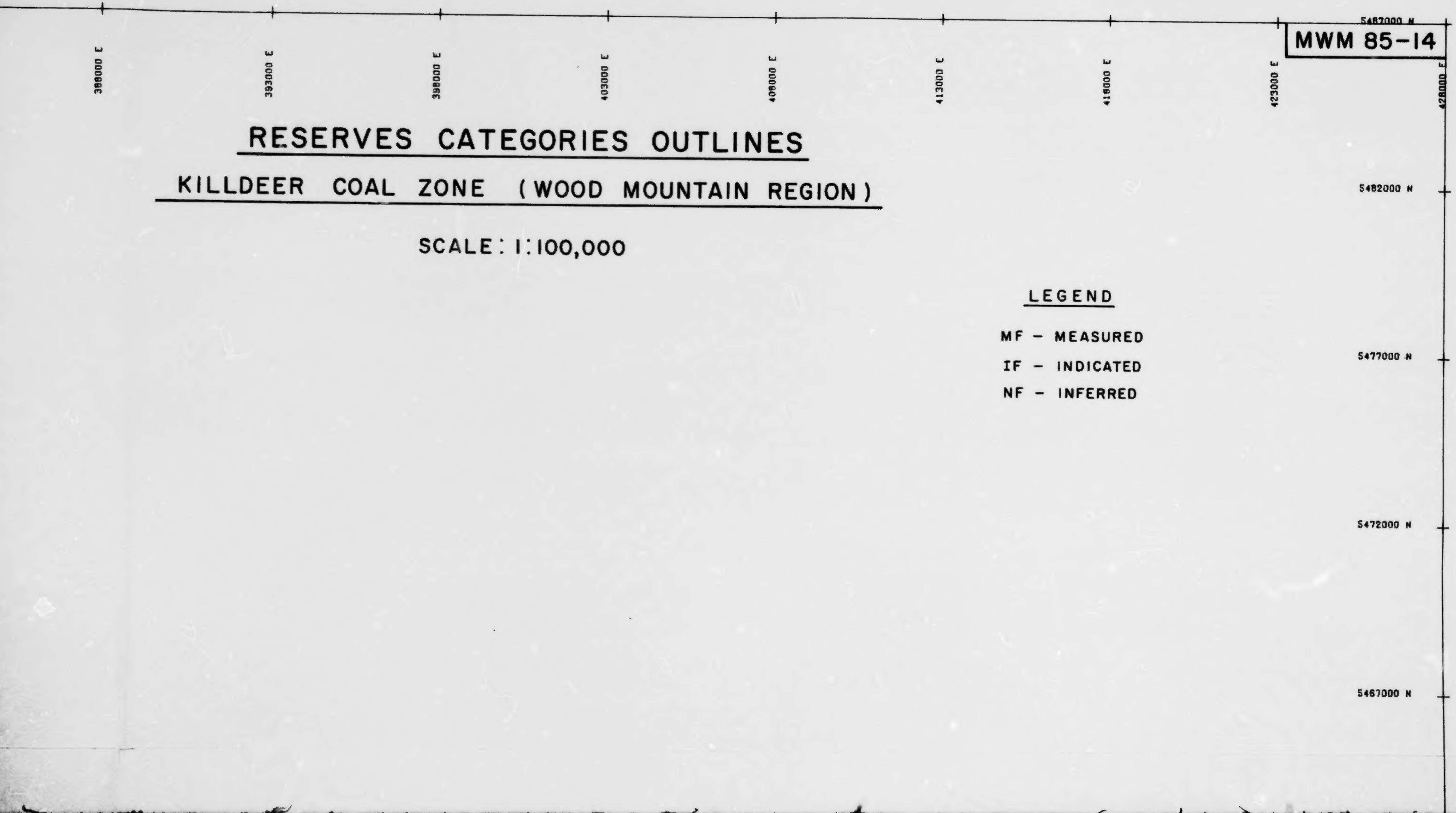
SCALE: 1:100,000

MWM 85-14

RESERVES CATEGORIES OUTLINES

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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5467000 N

LEGEND

MF - MEASURED

IF - INDICATED

NF - INFERRED

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IF-1

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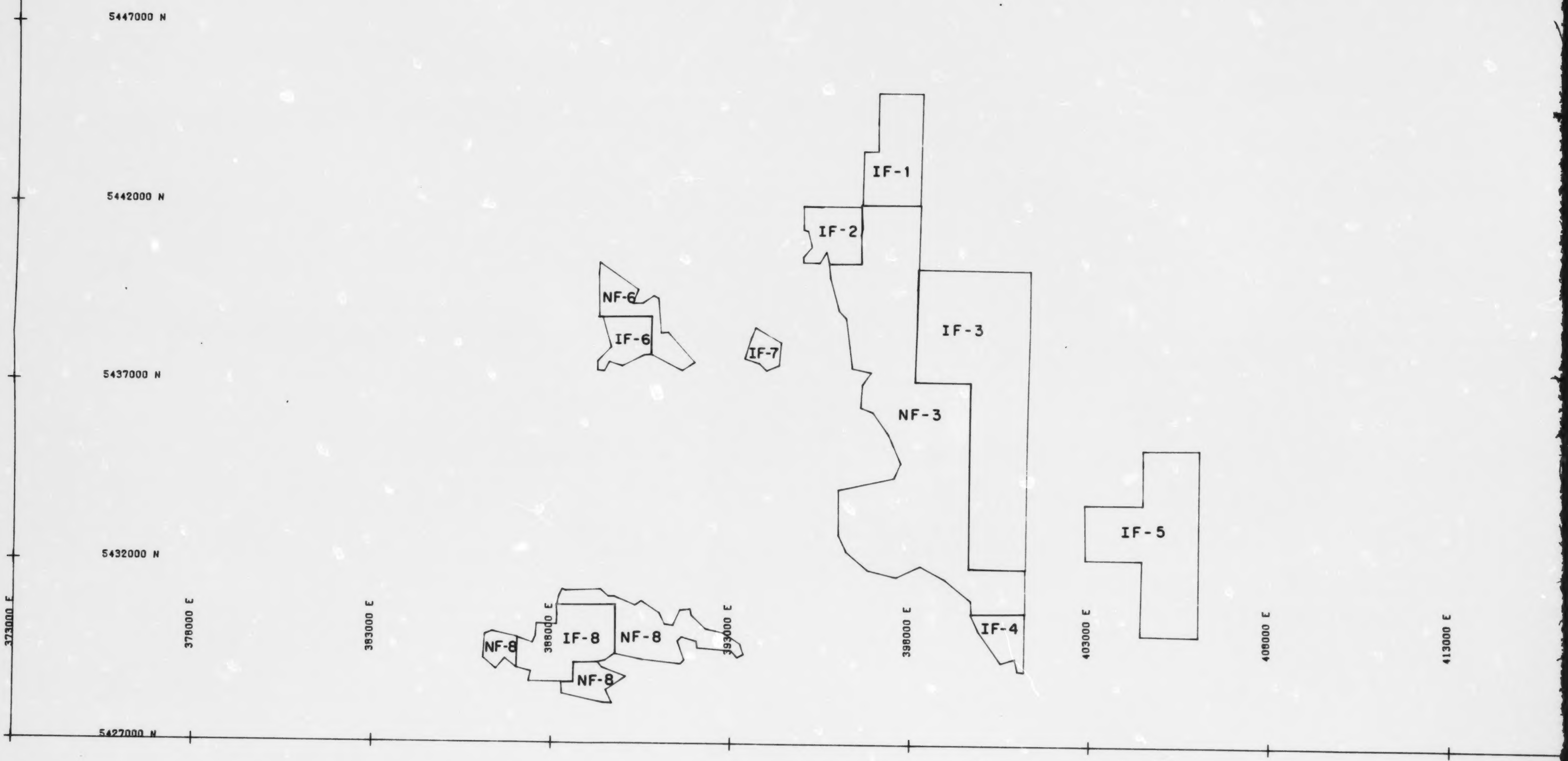
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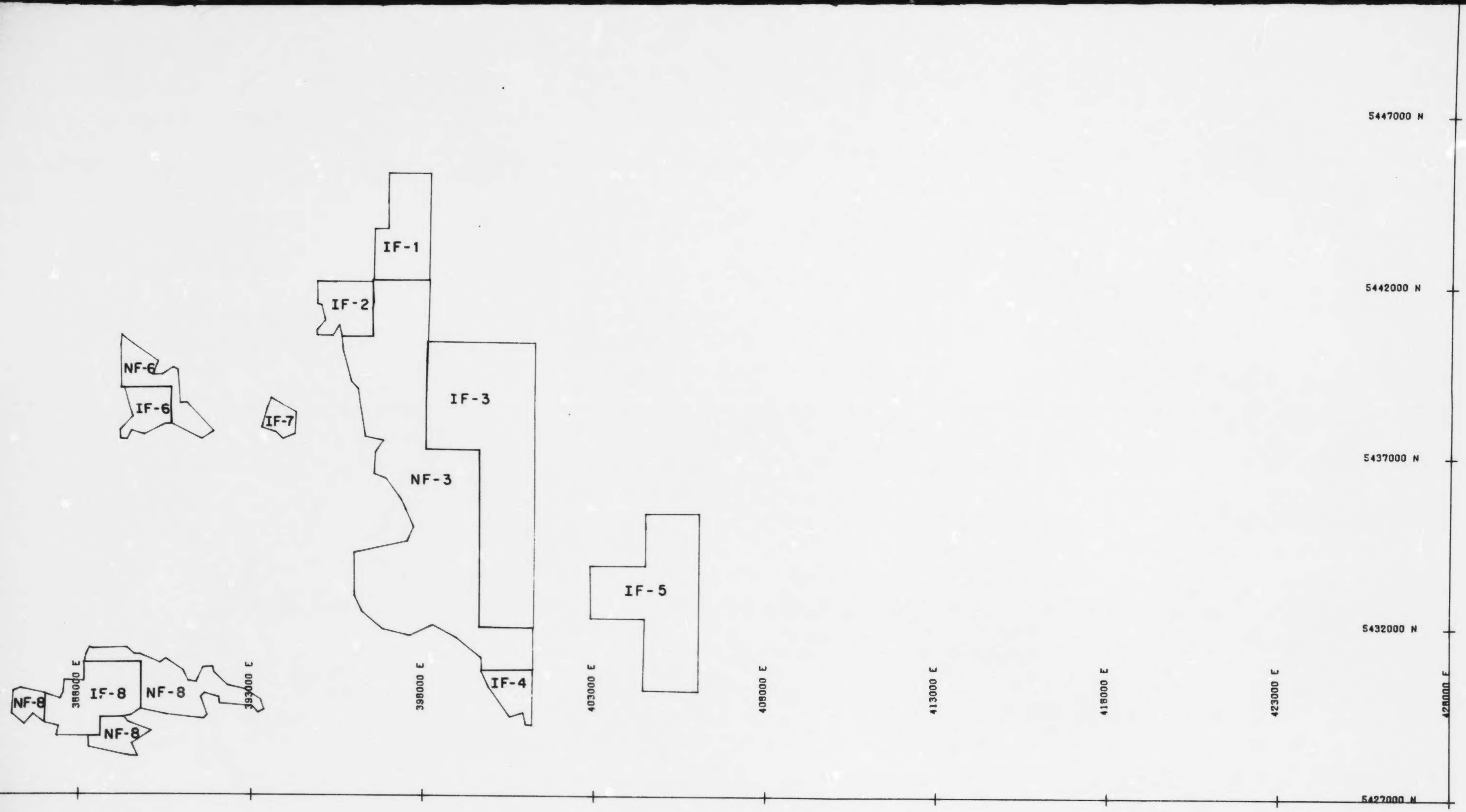
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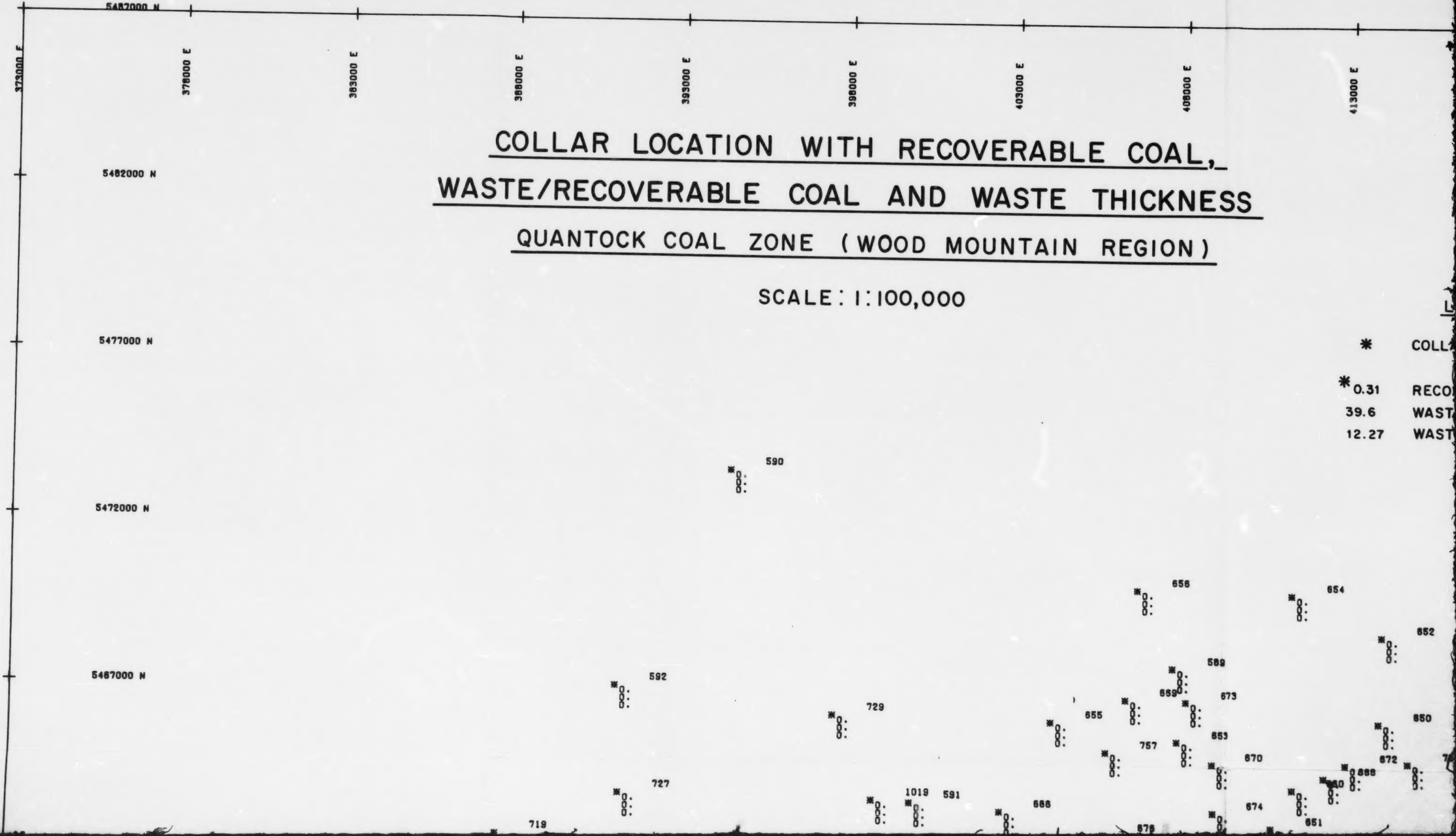
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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* COLL
*0.31 RECO
39.6 WAST
12.27 WAST
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673
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757
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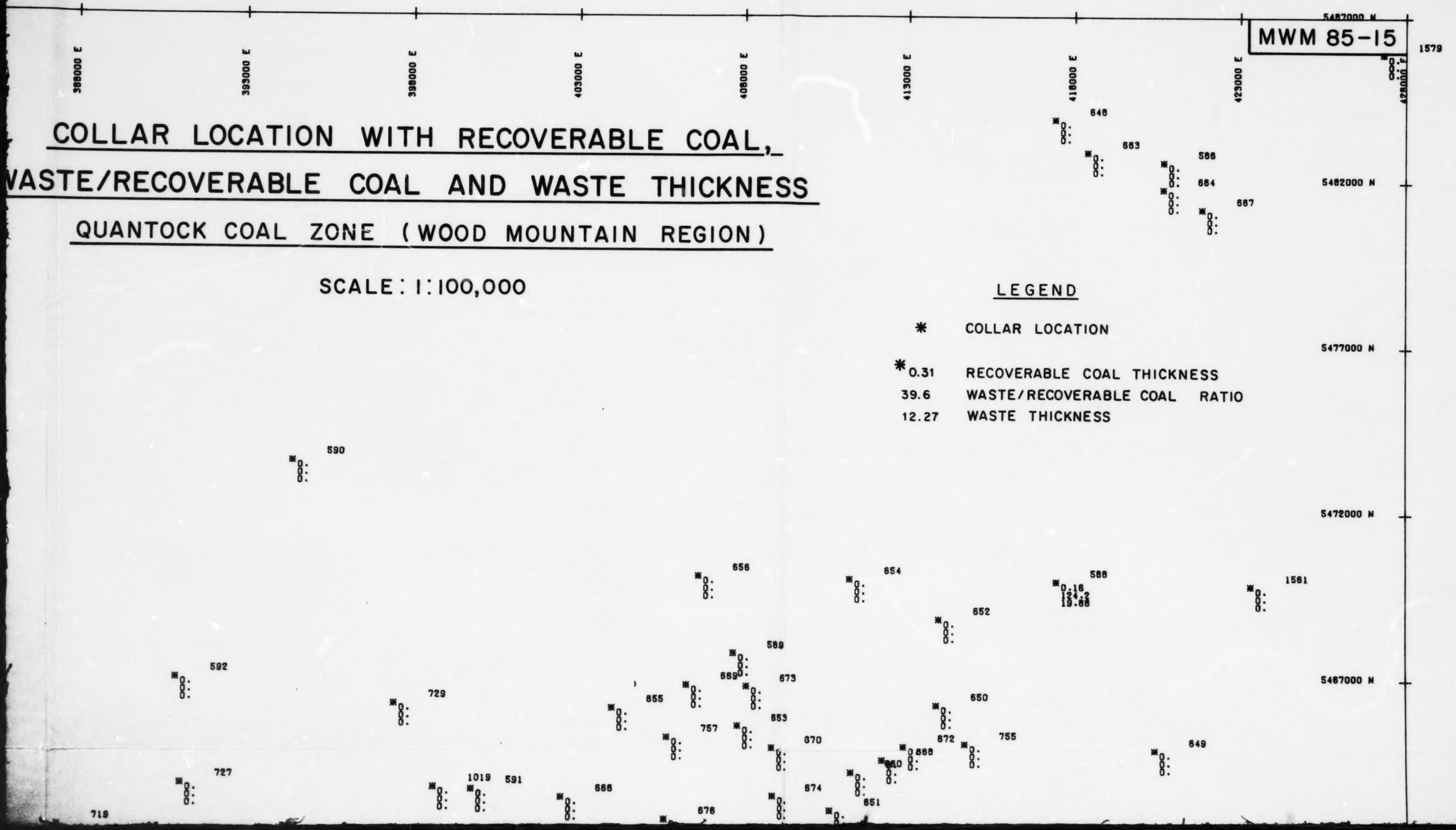
672
668
660
674
651
676

MWM 85-15

COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

QUANTOCK COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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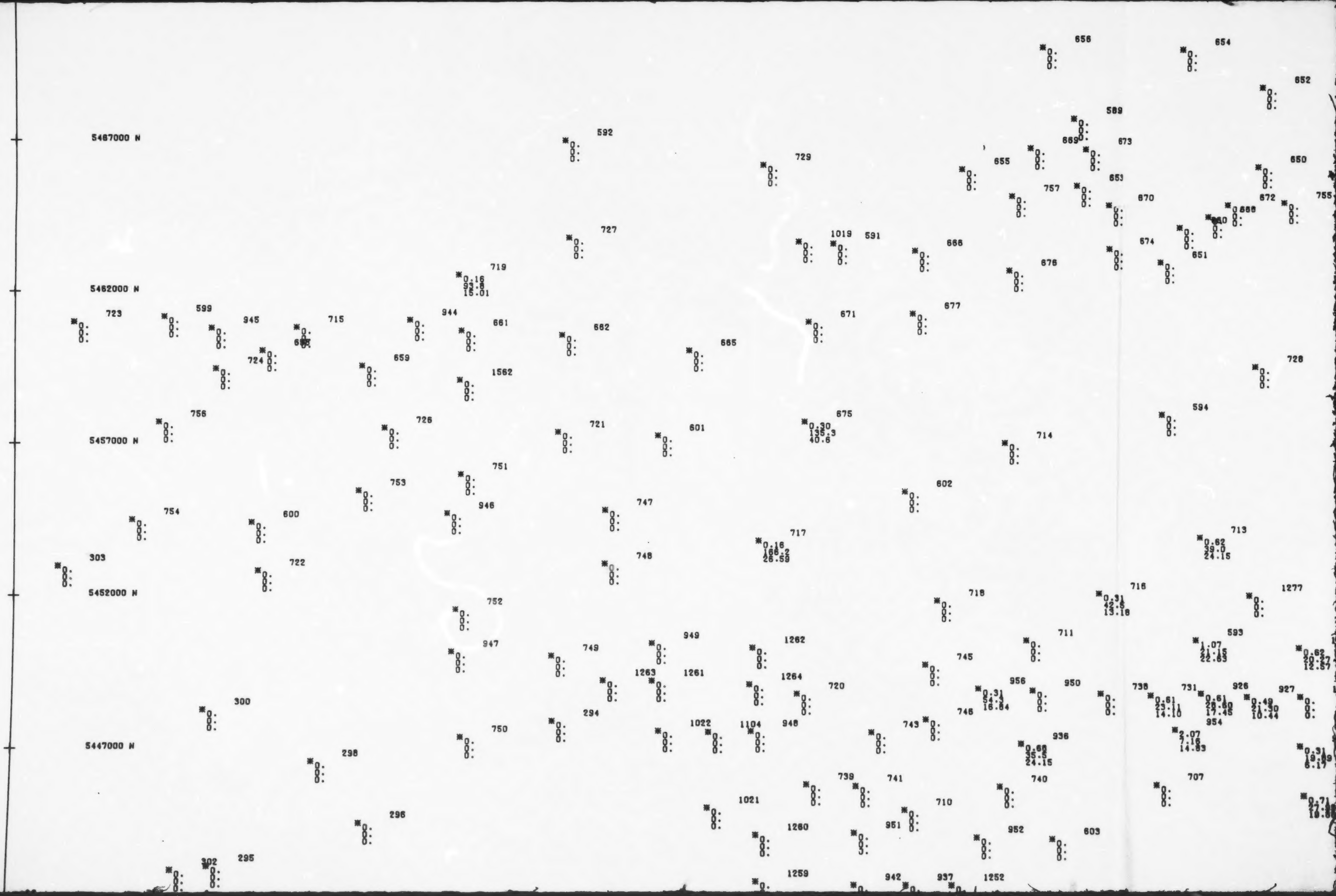
LEGEND

*	COLLAR LOCATION
*0.31	RECOVERABLE COAL THICKNESS
39.6	WASTE/RECOVERABLE COAL RATIO
12.27	WASTE THICKNESS



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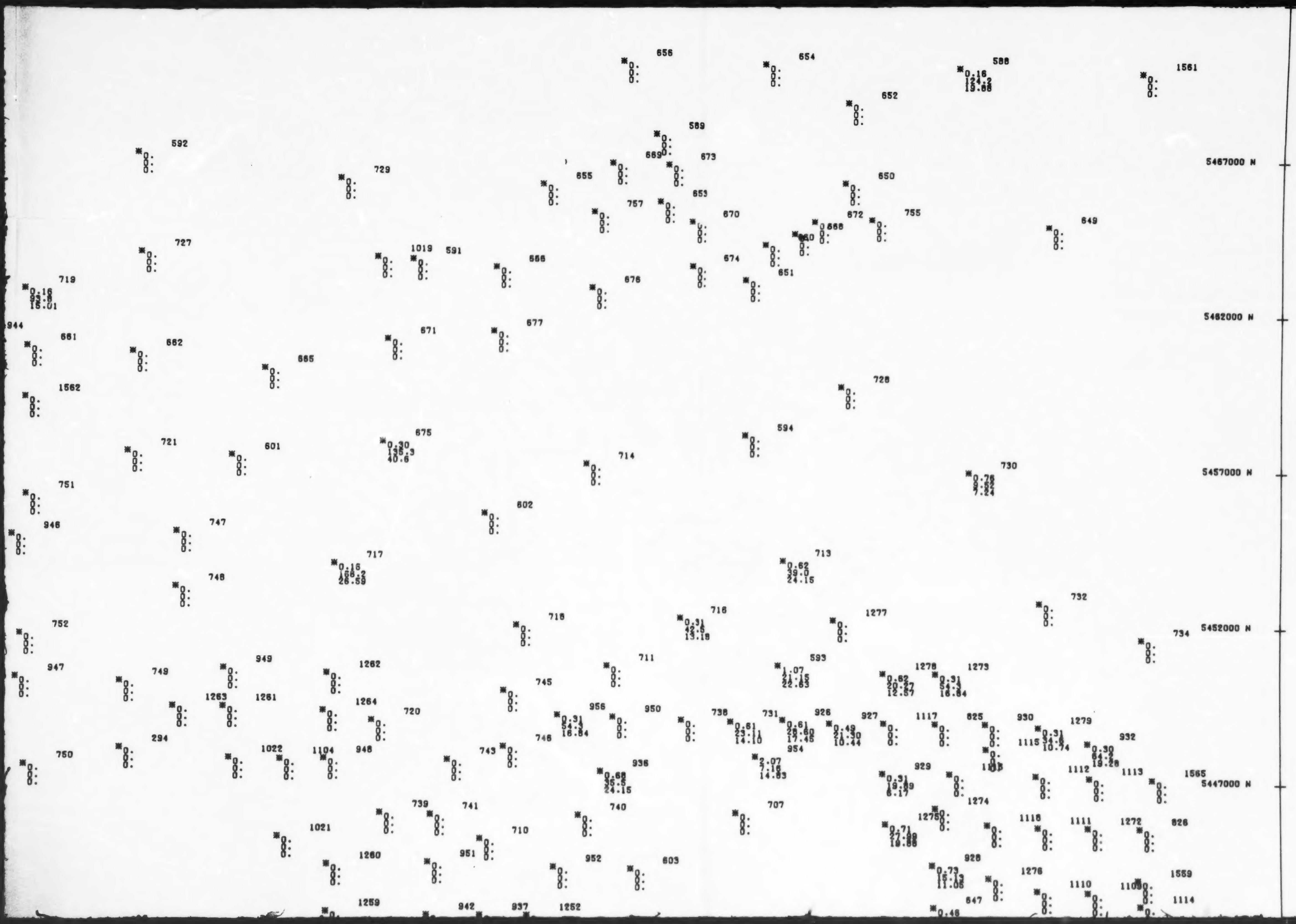
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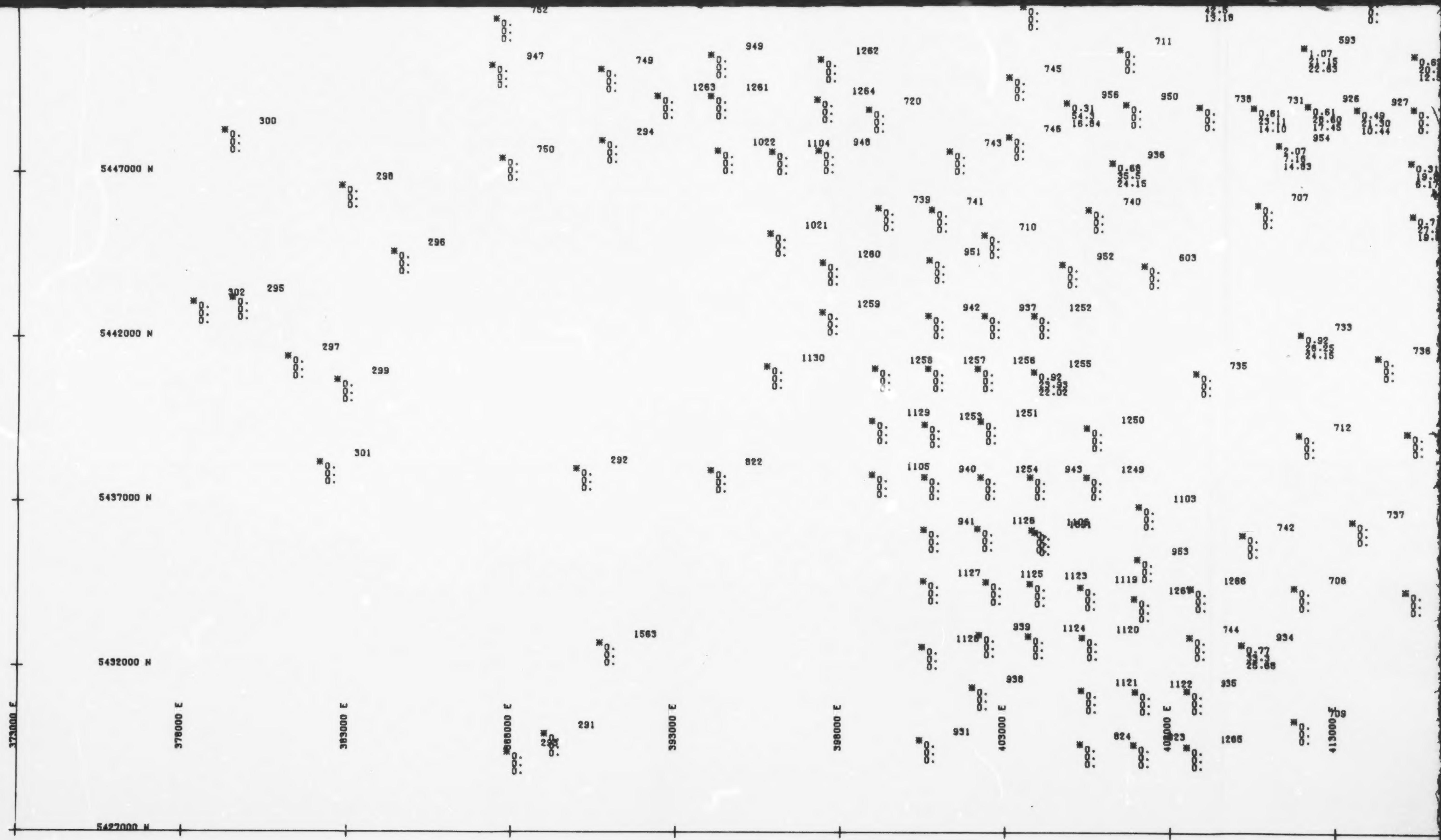
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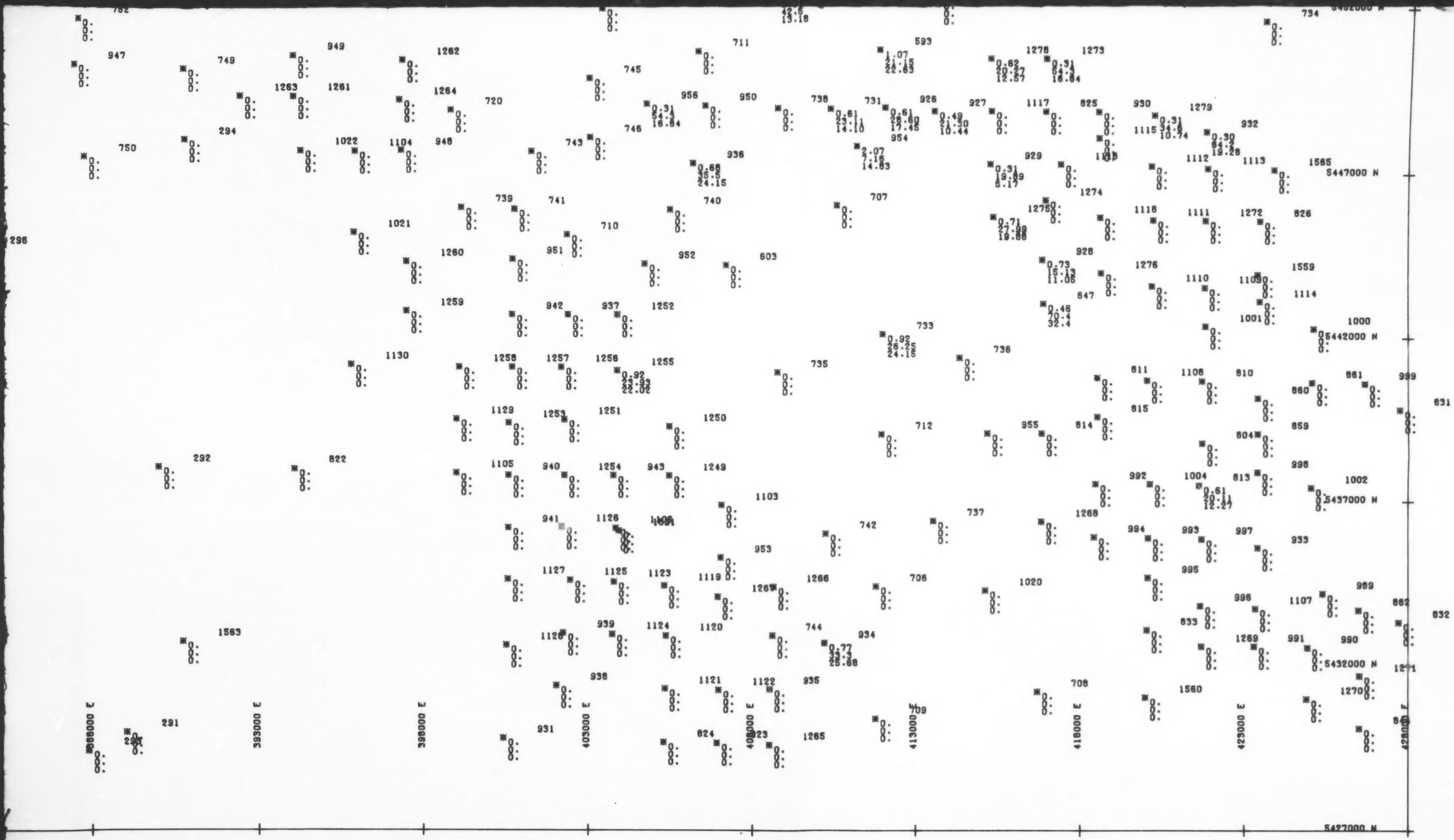

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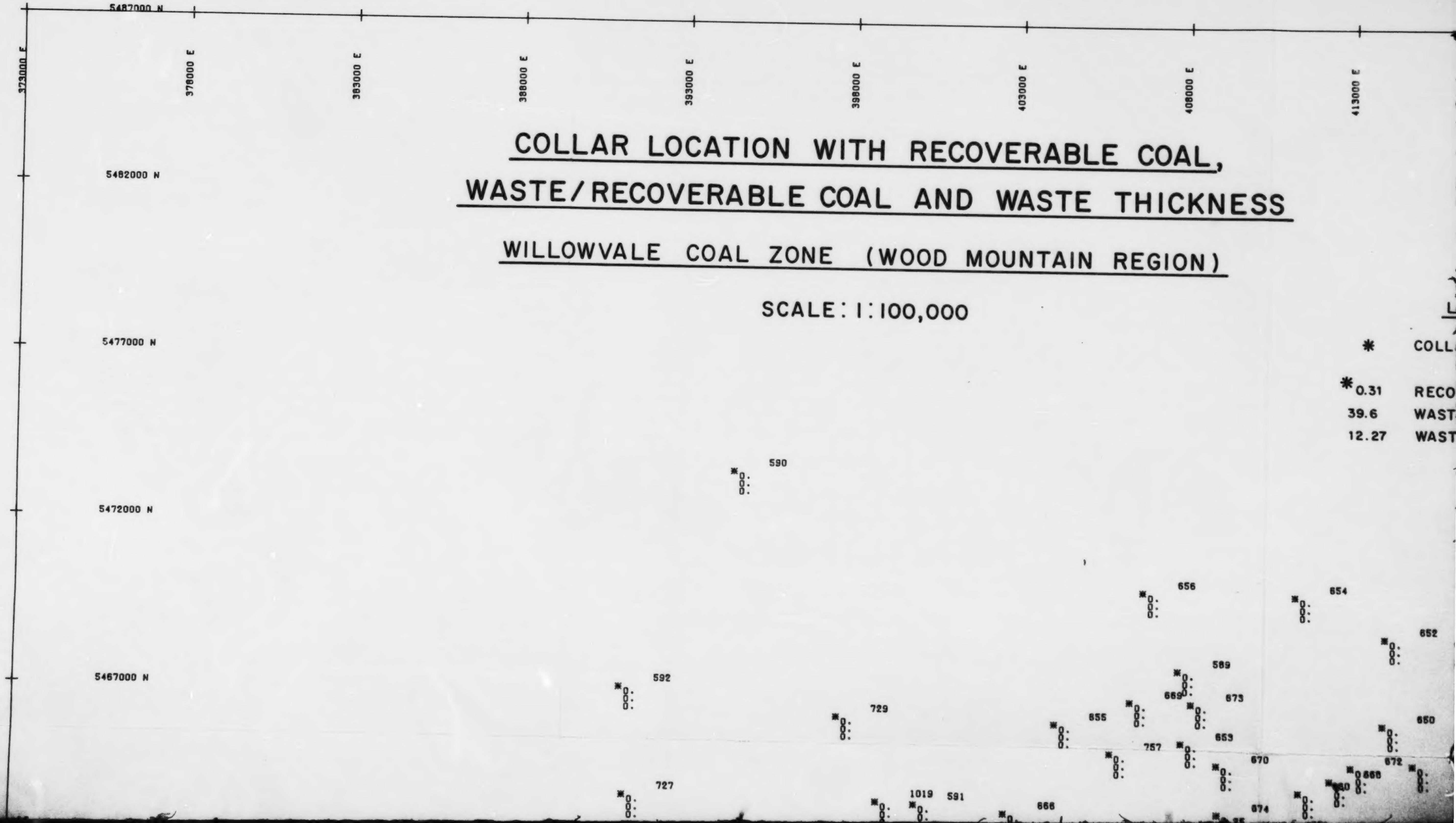
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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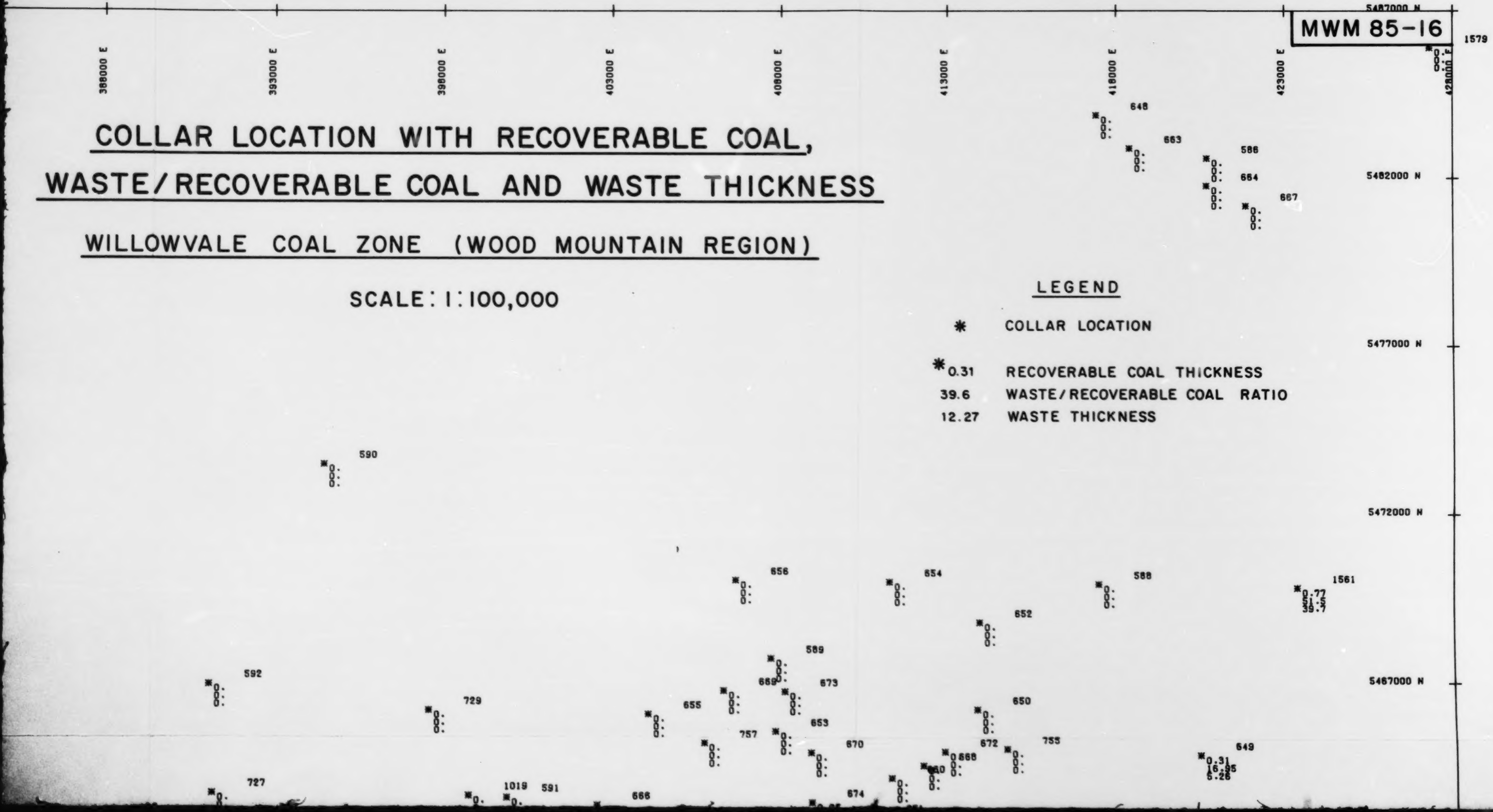
MWM 85-16
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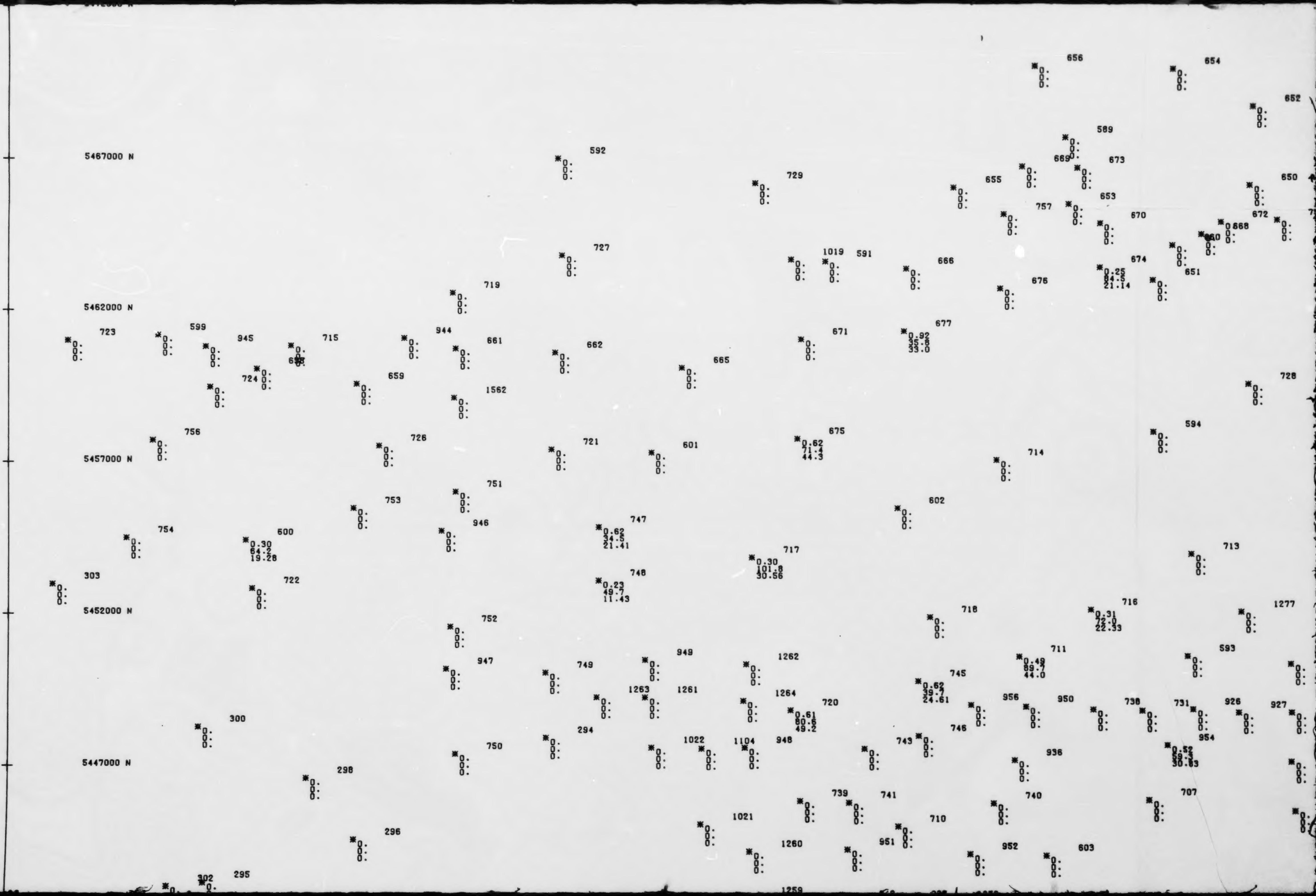
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

WILLOWVALE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000

LEGEND

✱	COLLAR LOCATION
✱0.31	RECOVERABLE COAL THICKNESS
39.6	WASTE/RECOVERABLE COAL RATIO
12.27	WASTE THICKNESS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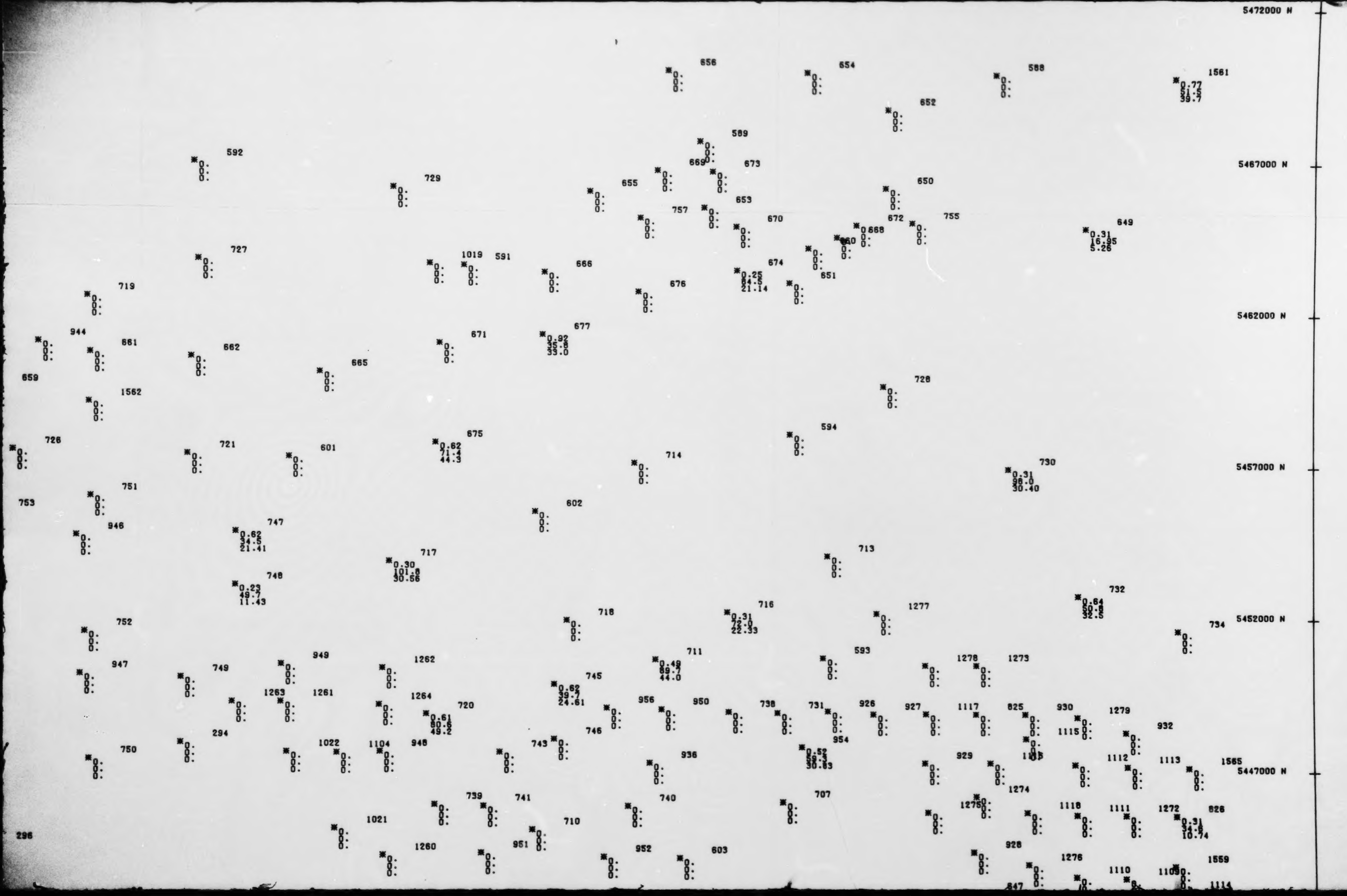
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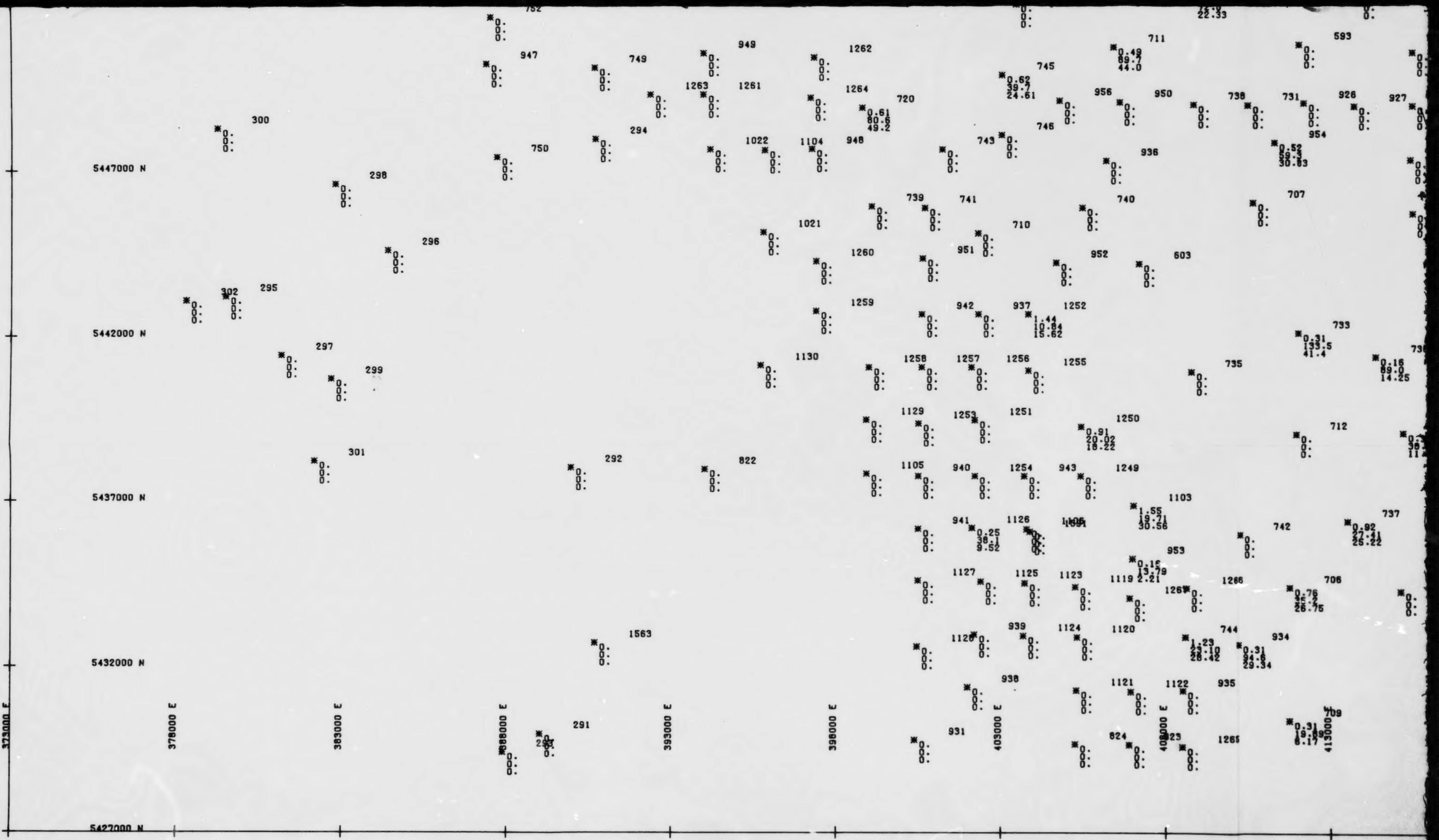
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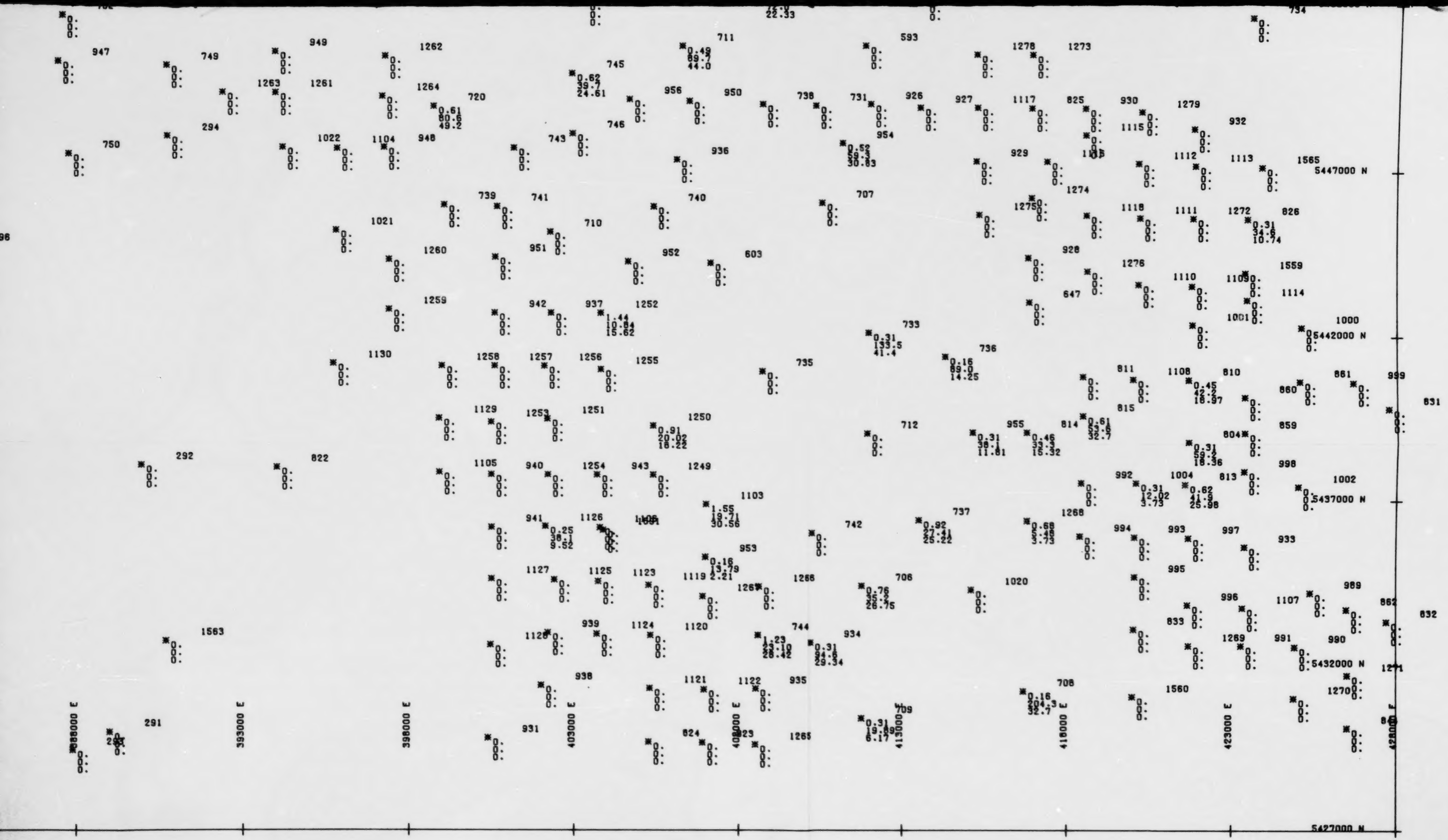
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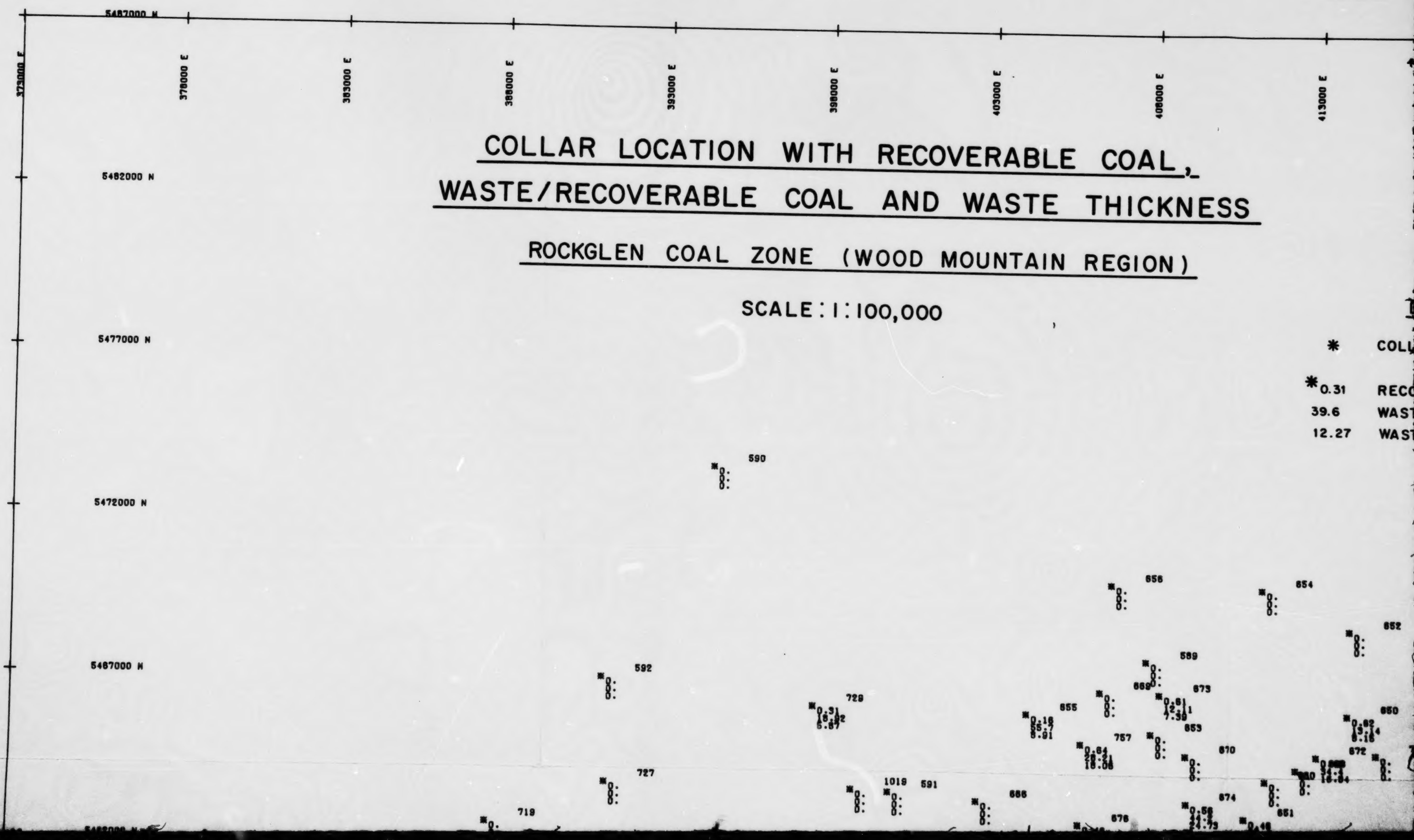
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

SCALE : 1 : 100,000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12.27 WAST
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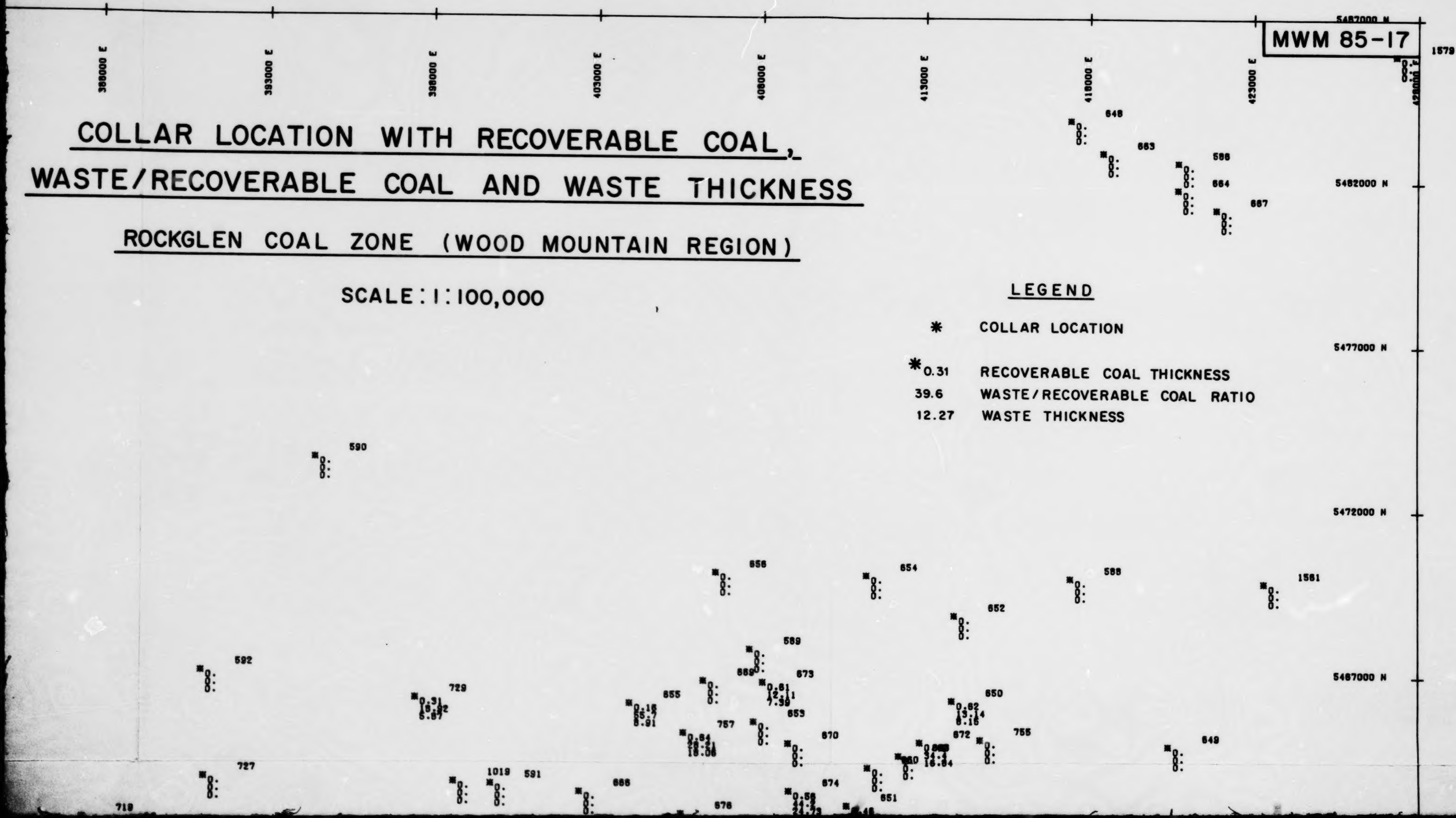

COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

ROCKGLEN COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000

MWM 85-17

LEGEND

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39.6	WASTE/RECOVERABLE COAL RATIO
12.27	WASTE THICKNESS

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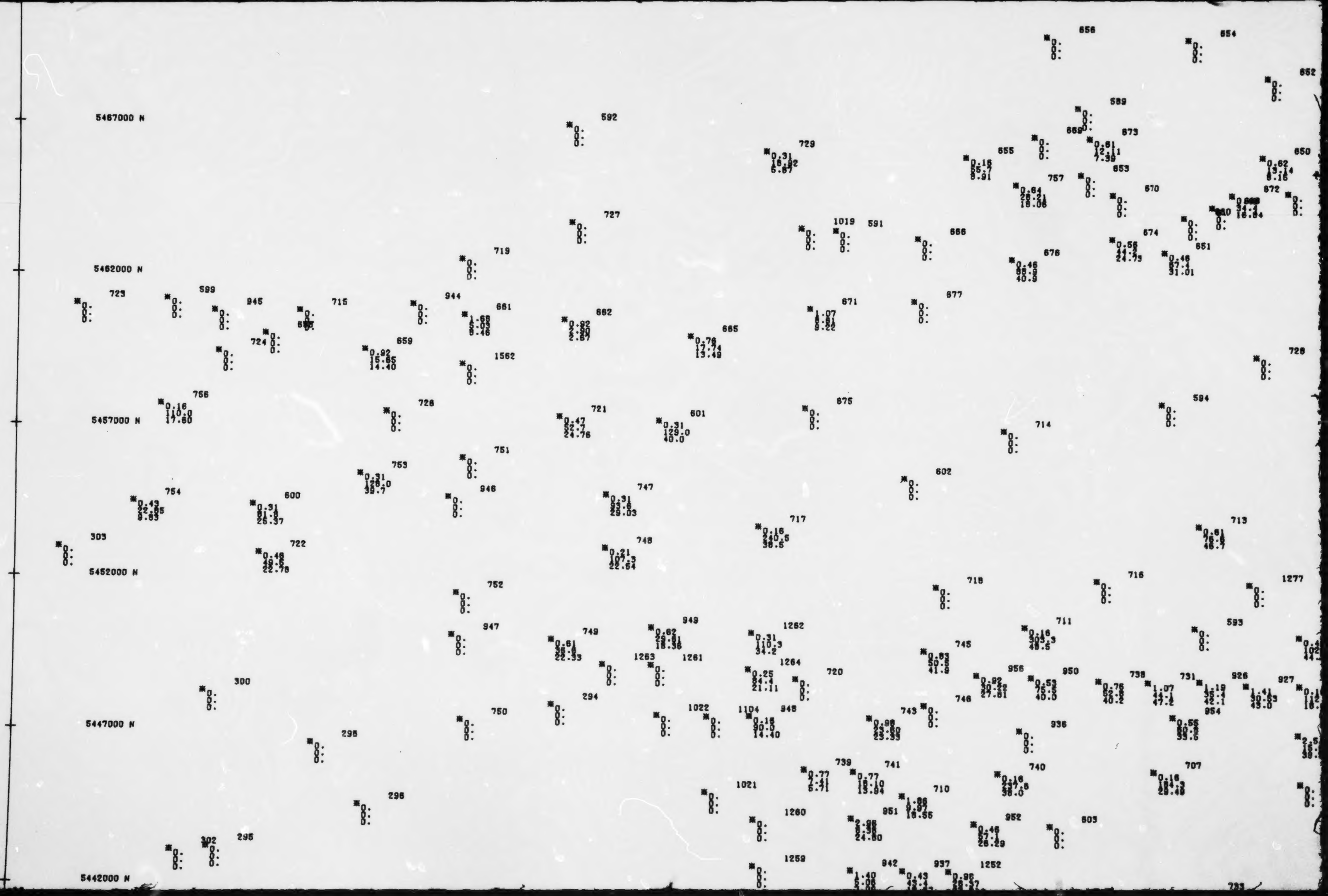
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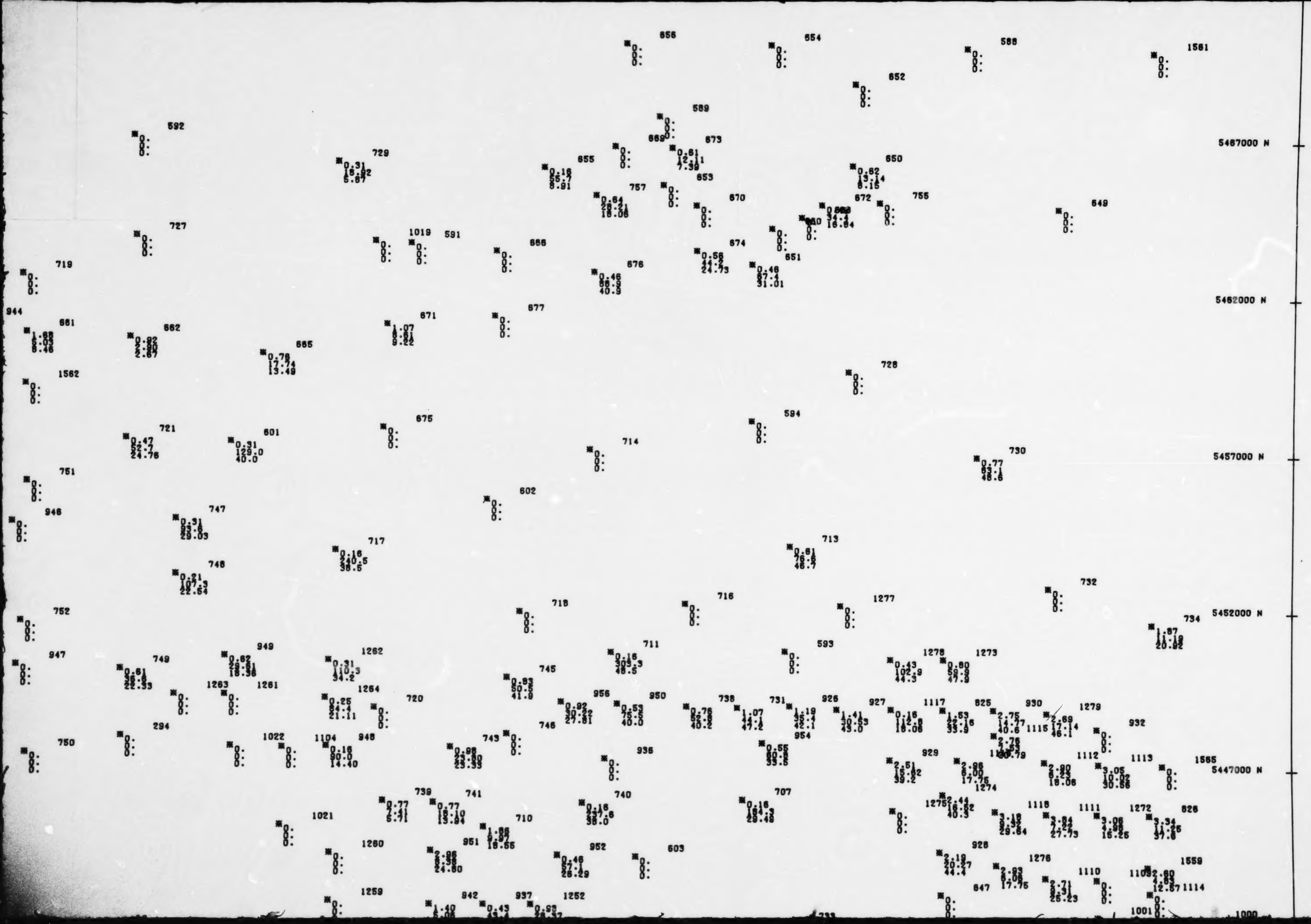
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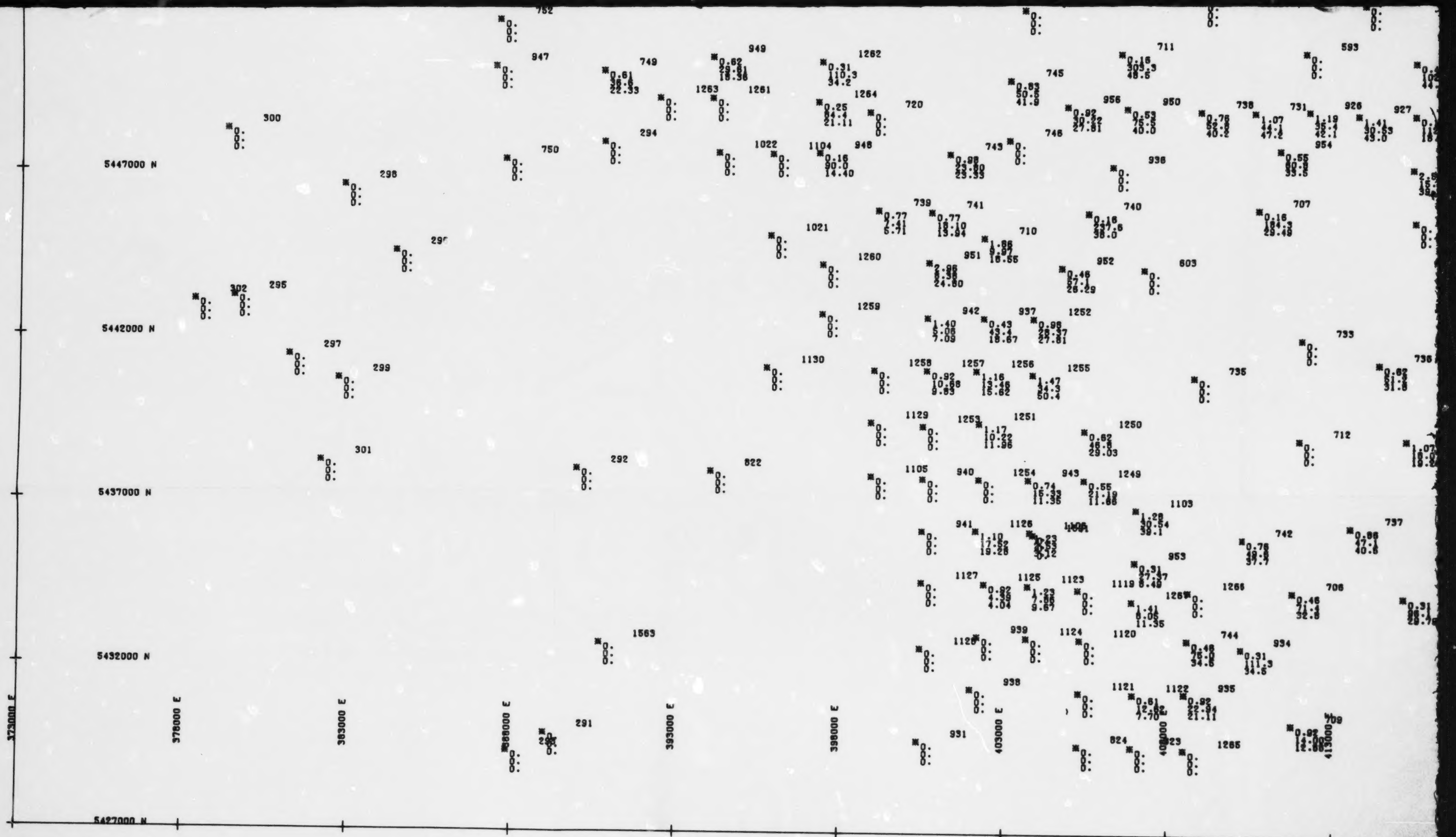
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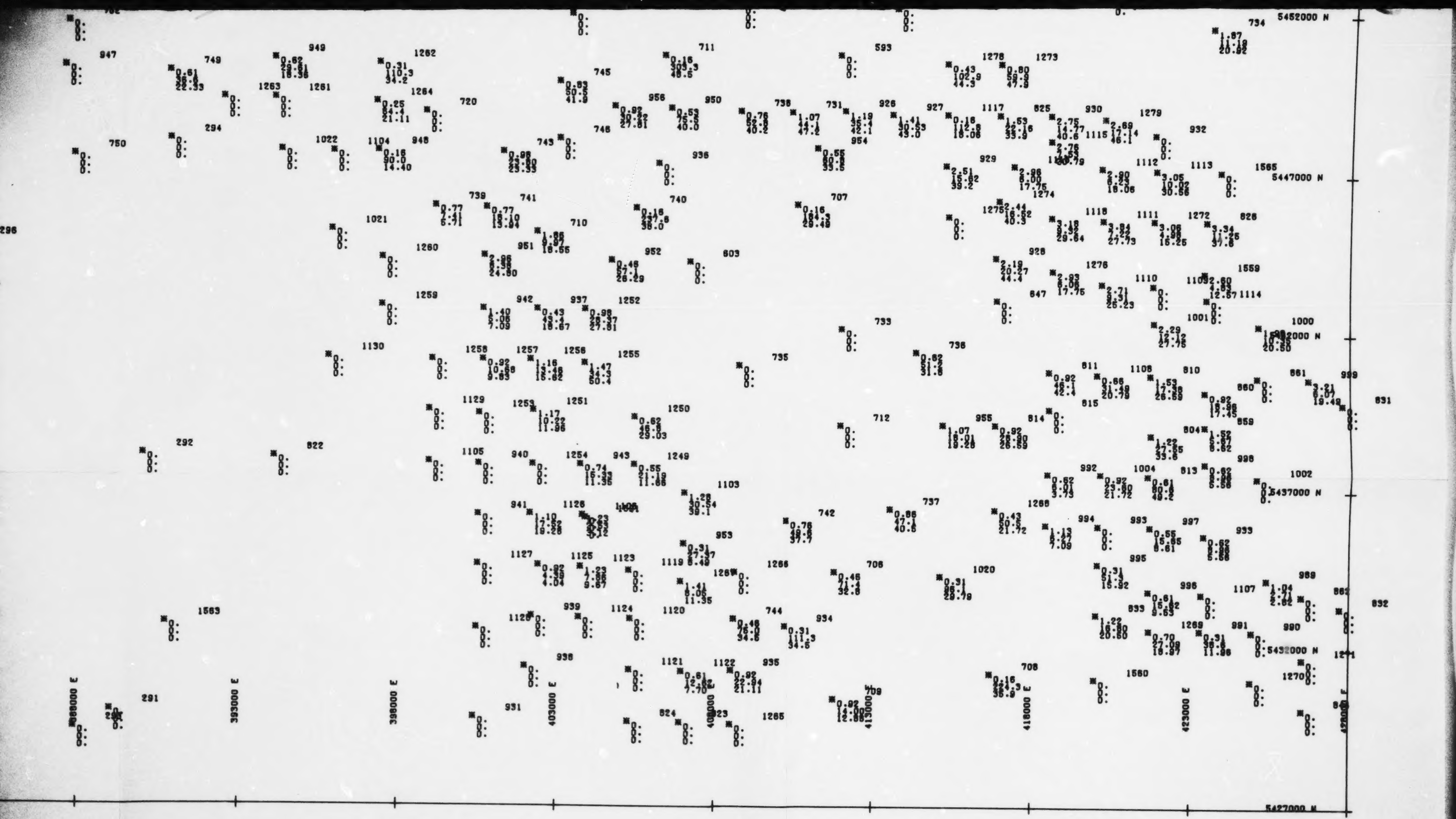
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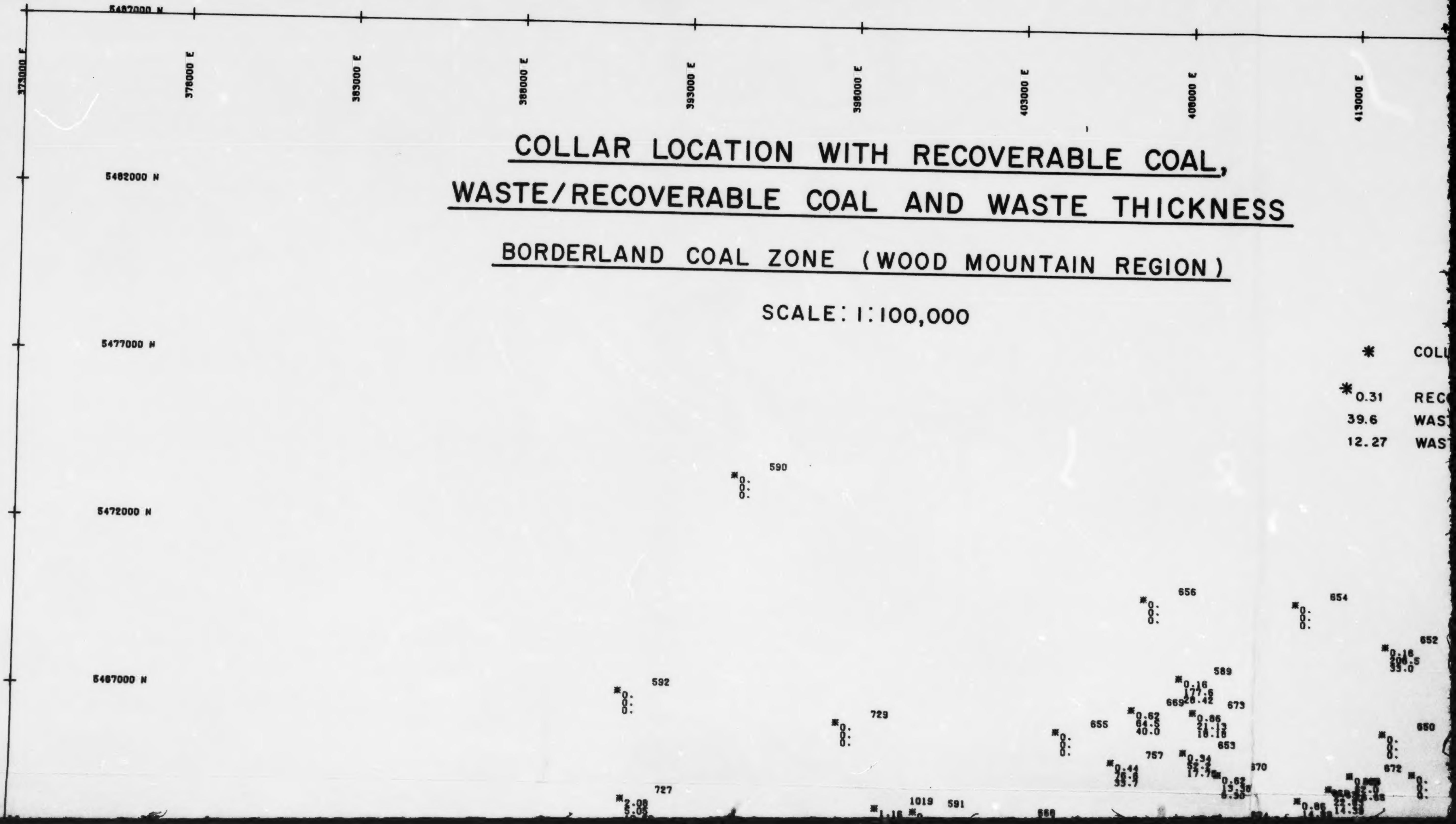
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

BORDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000



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14.38

MWM 85-18

COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

BORDERLAND COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000

LEGEND

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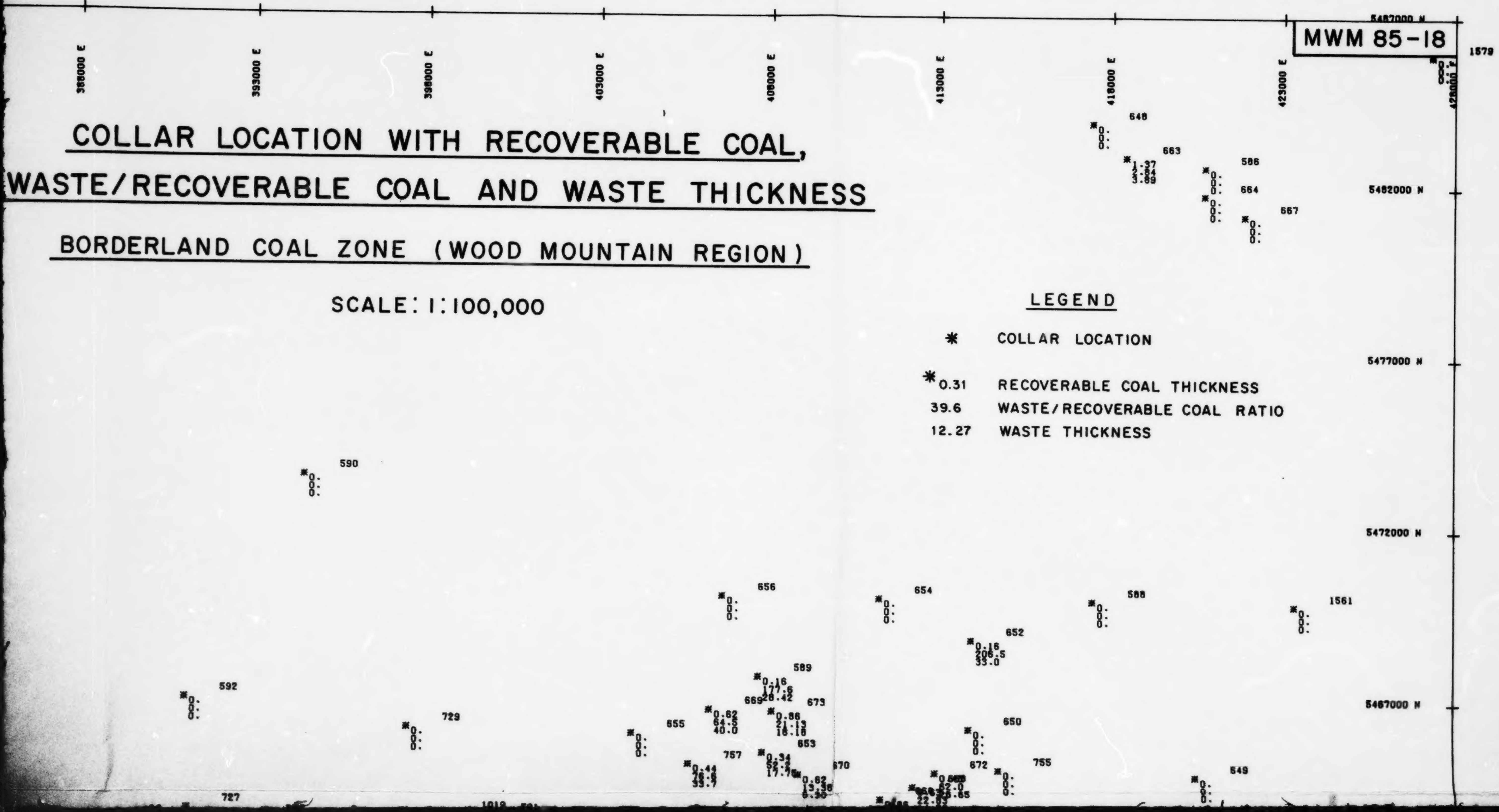
12.27	WASTE THICKNESS



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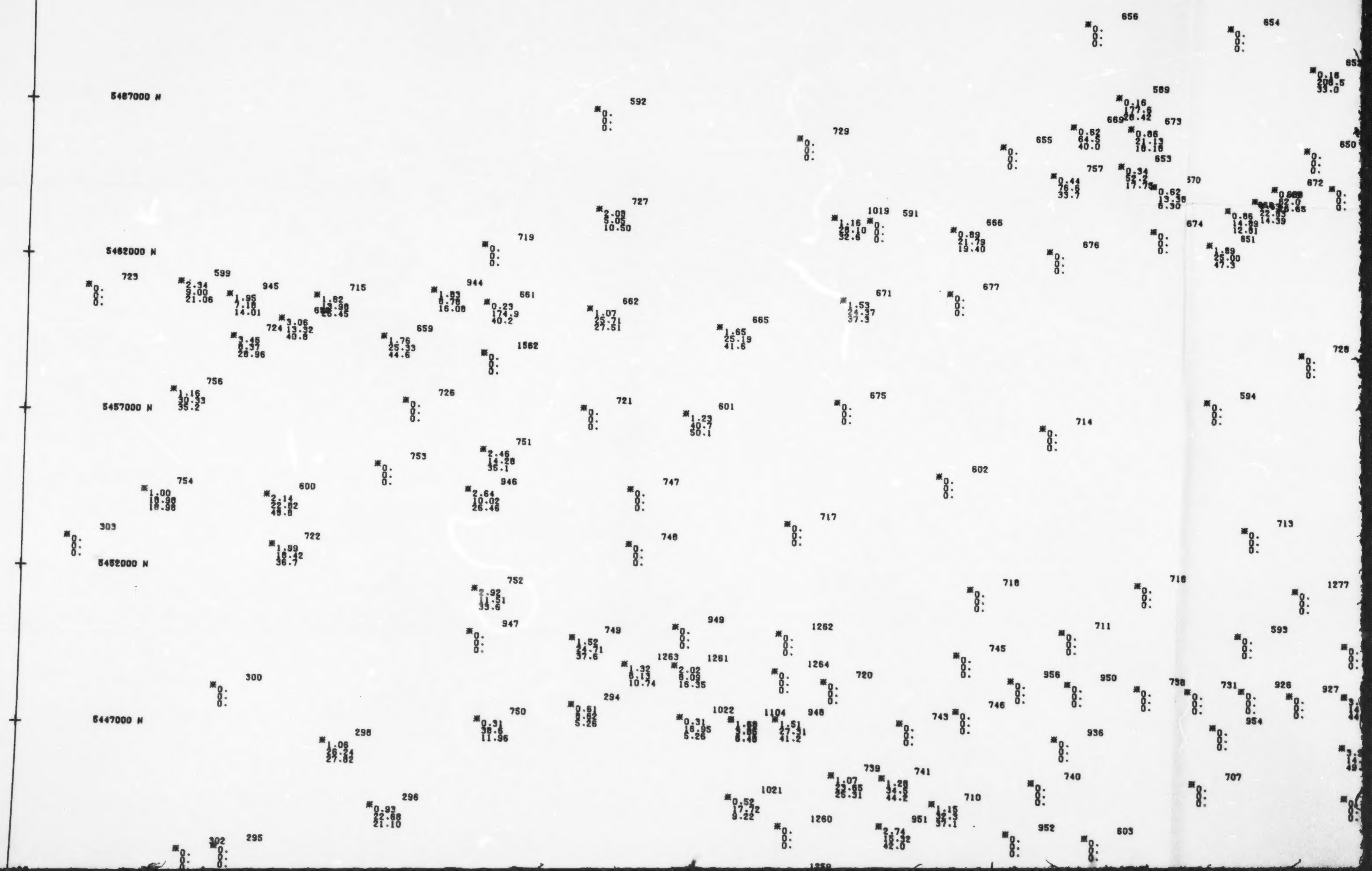
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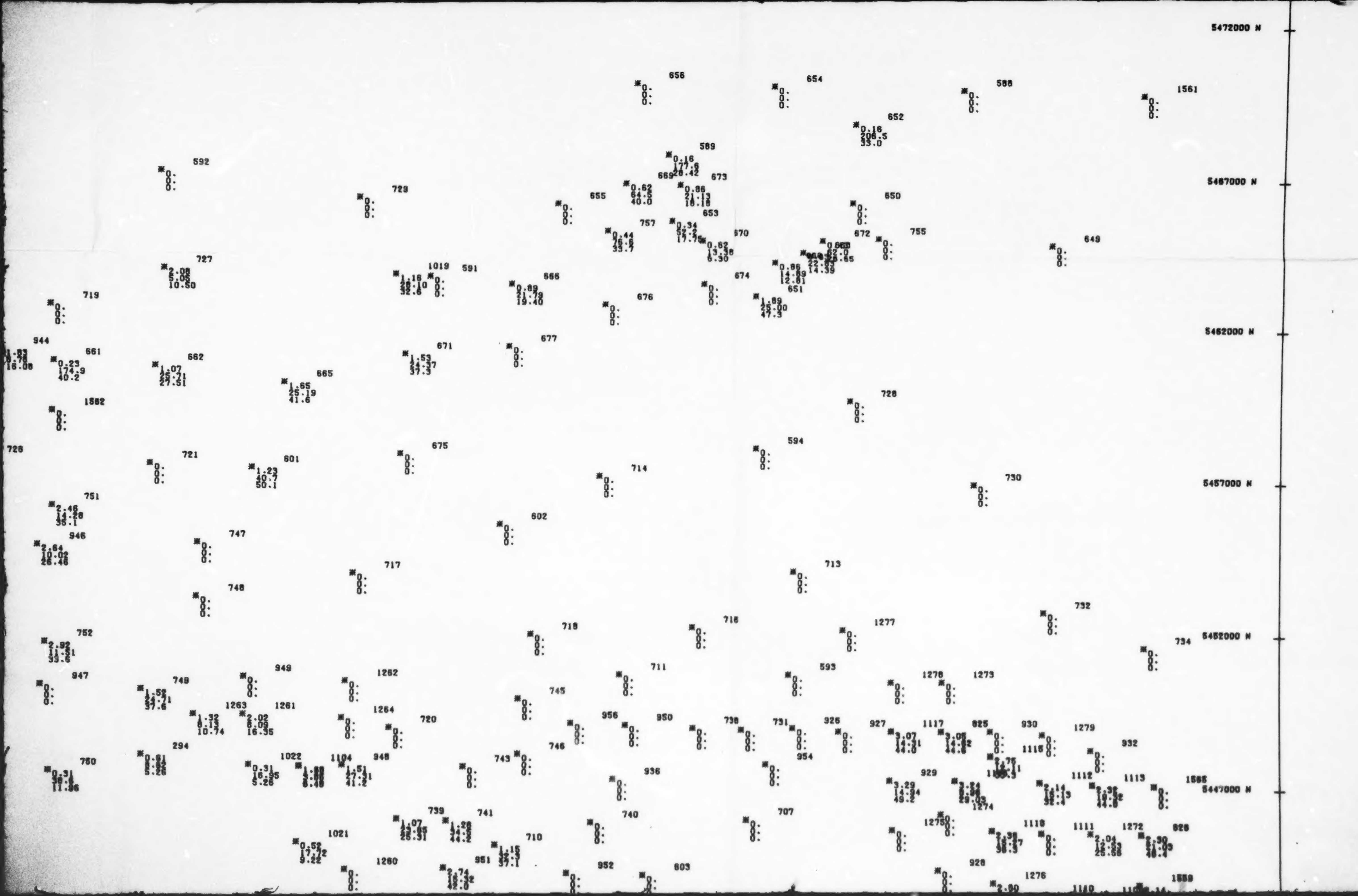
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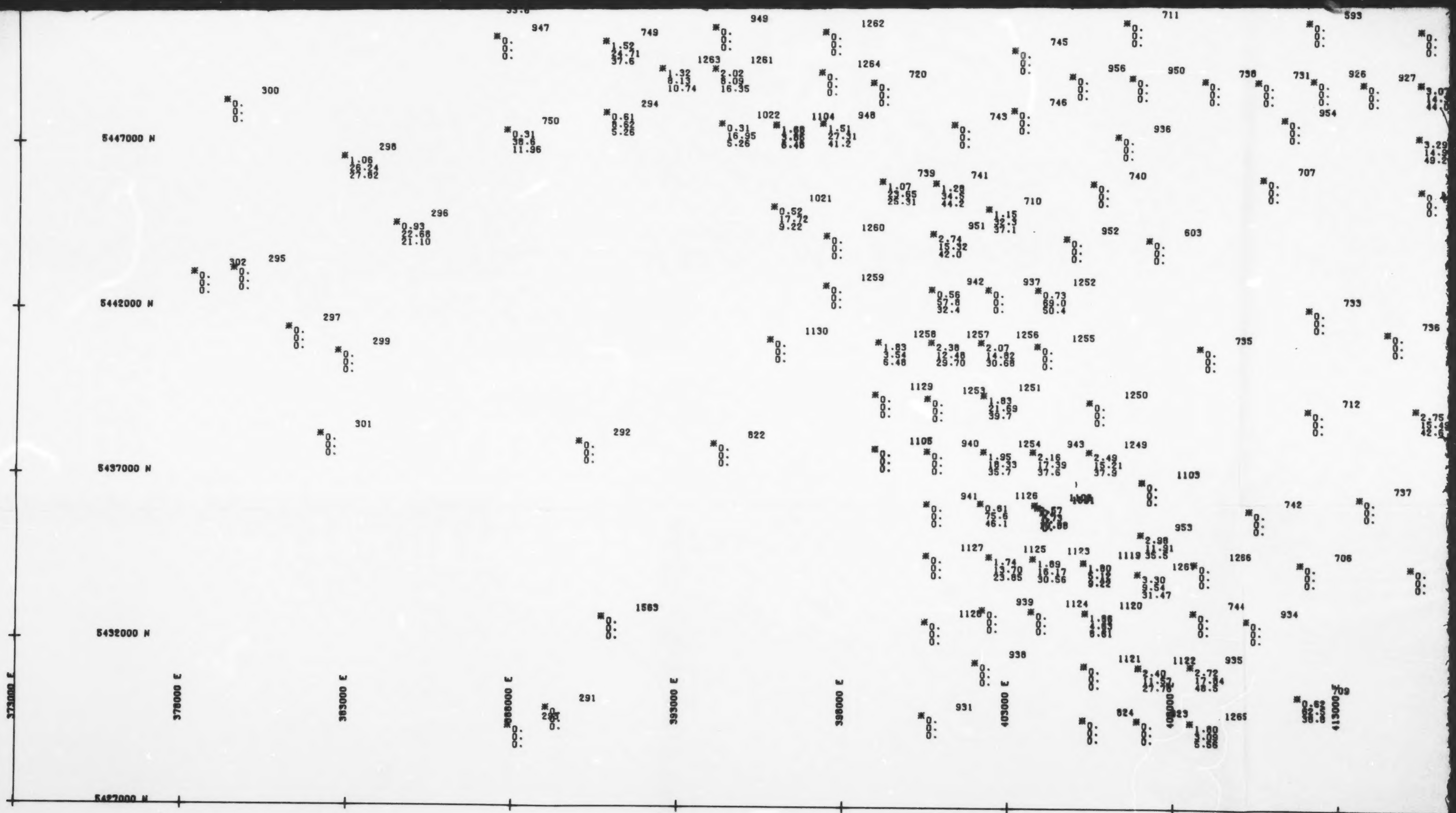
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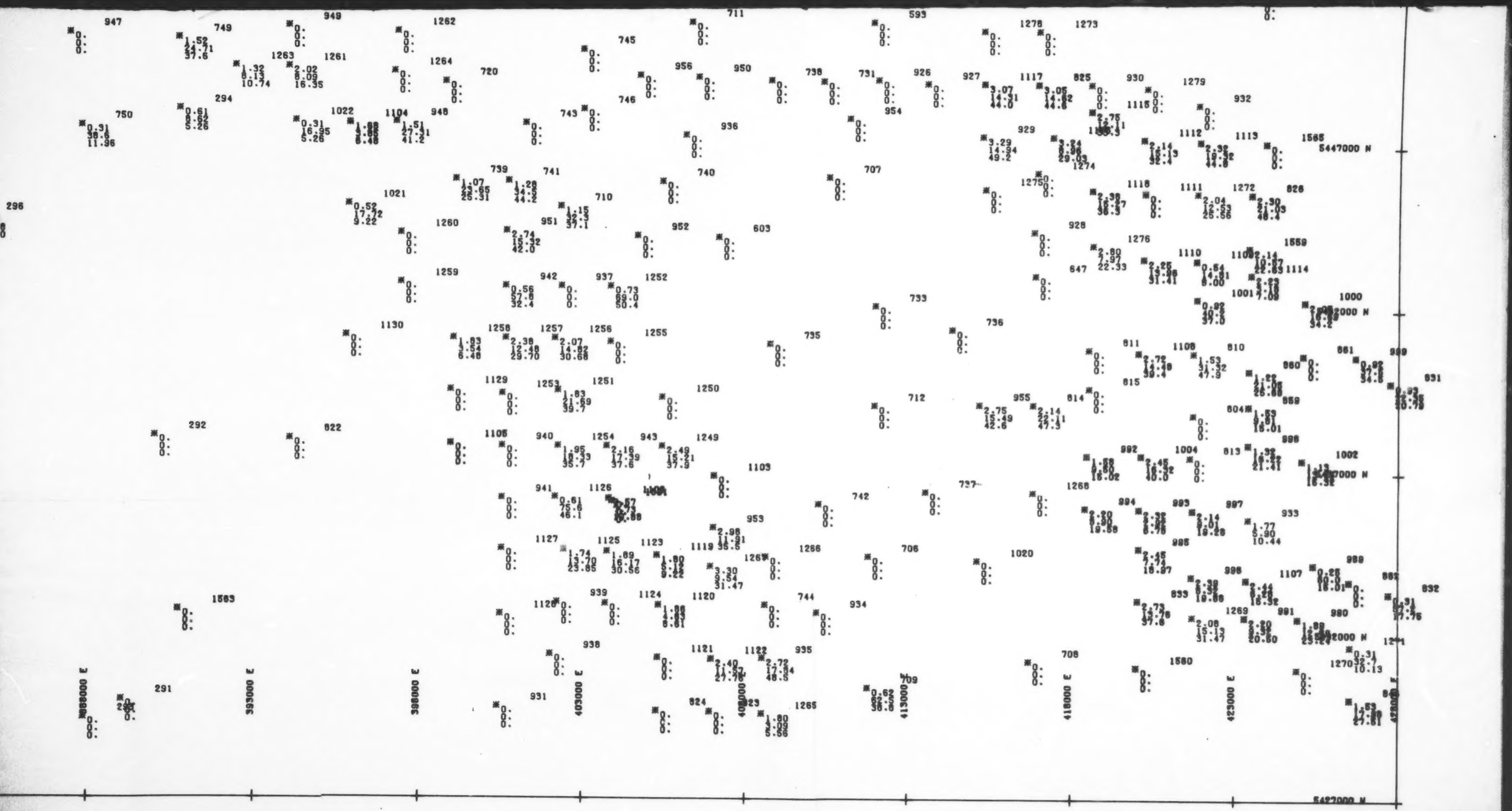
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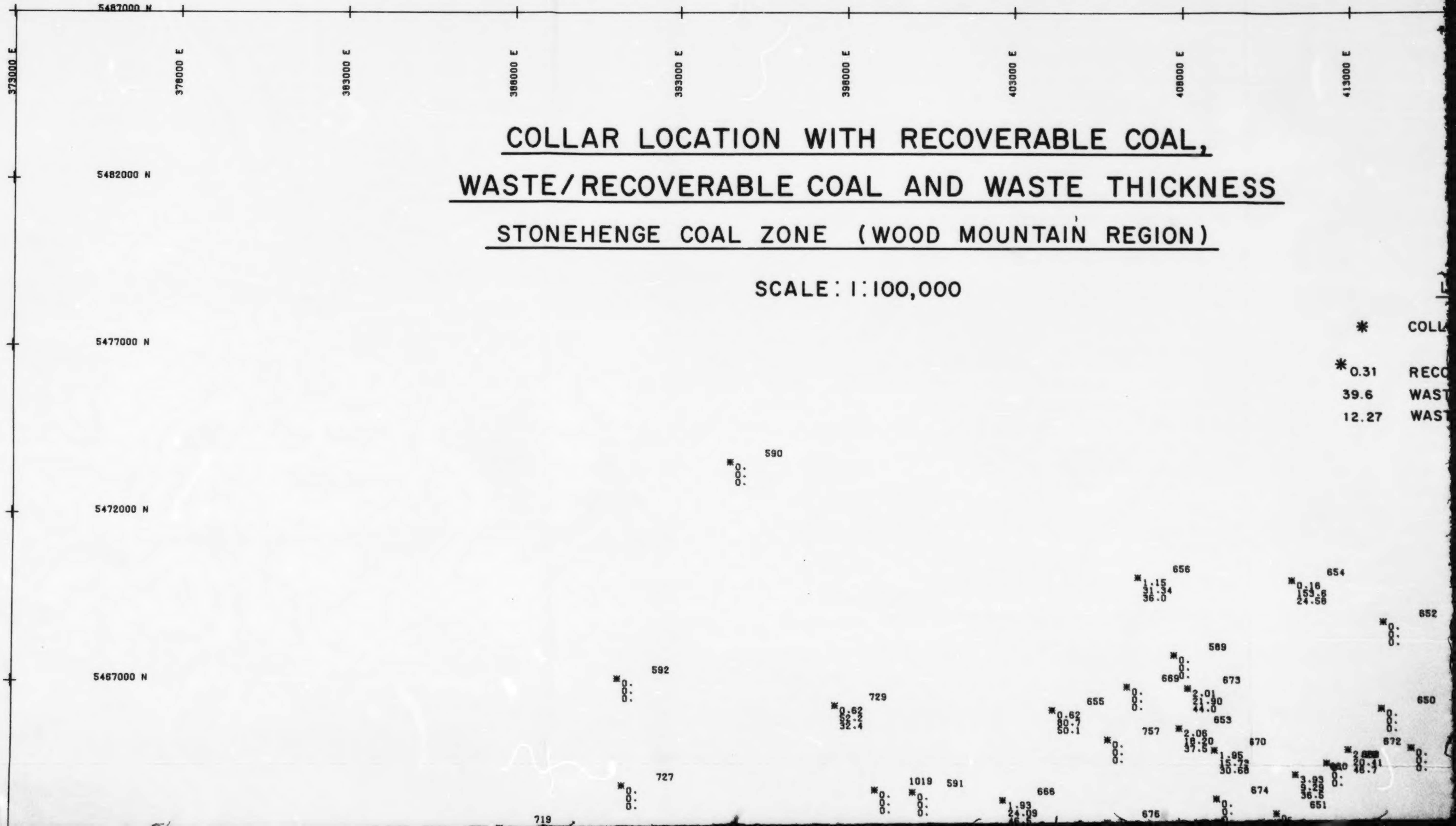
418000 E
423000 E
428000 E

COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

STONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000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*0.31 RECO
39.6 WAST
12.27 WAST
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656
1.15 31.34 36.0
654
0.16 153.6 24.58
652
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589
0. 0. 0.
669
673
2.01 21.90 44.0
655
0. 0. 0.
0.62 80.7 50.1
653
757
2.06 18.20 37.5
670
1.95 15.72 30.68
650
0. 0. 0.
672
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592
0. 0. 0.
729
0.62 52.2 32.4
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1019
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666
1.93 24.09 46.5
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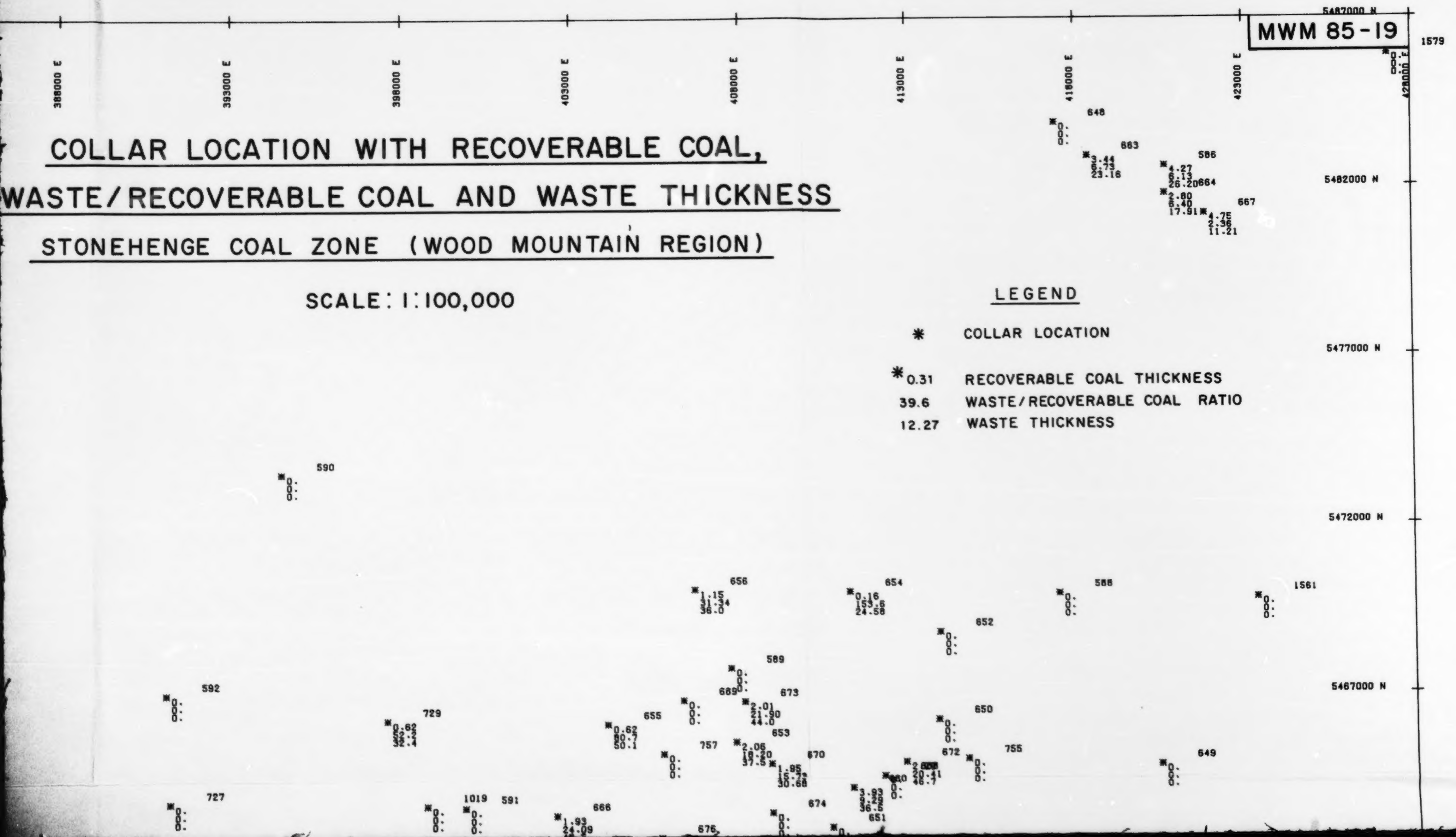
719

MWM 85-19



COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

STONEHENGE COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000

LEGEND

✱	COLLAR LOCATION
✱0.31	RECOVERABLE COAL THICKNESS
39.6	WASTE/RECOVERABLE COAL RATIO
12.27	WASTE THICKNESS

388000 E
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423000 E
428000 E
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17.91
667
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654
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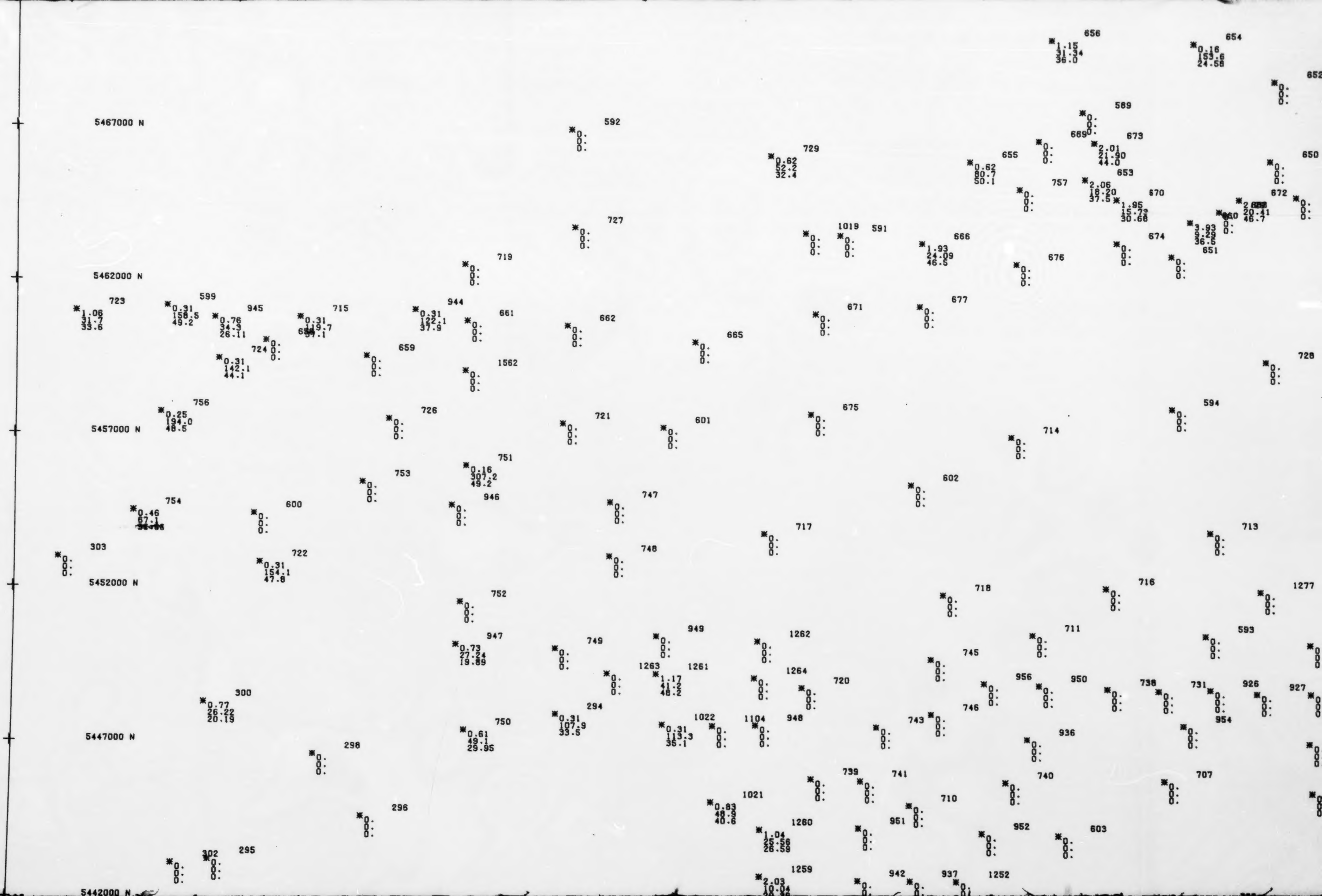
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672 *2.88 20.41 46.7
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727 *0. 0. 0.
1019 *0. 0. 0.
591
666 *1.93 24.09 46.5
674
651 *3.93 9.29 36.5
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5462000 N
723 *1.06 31.7 33.6
599 *0.31 156.5 49.2
945 *0.76 34.3 26.11
715 *0.31 119.7 34.1
658
944 *0.31 122.1 37.9
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671 *0. 0. 0.
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*0.31 142.1 44.1
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728 *0. 0. 0.
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675 *0. 0. 0.
594 *0. 0. 0.
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714 *0. 0. 0.
751 *0.16 307.2 49.2
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602 *0. 0. 0.
946 *0. 0. 0.
747 *0. 0. 0.
754 *0.46 67.1
600 *0. 0. 0.
717 *0. 0. 0.
713 *0. 0. 0.
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718 *0. 0. 0.
716 *0. 0. 0.
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711 *0. 0. 0.
593 *0. 0. 0.
1263 *1.17 41.2 48.2
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745 *0. 0. 0.
1264 *0. 0. 0.
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950 *0. 0. 0.
738 *0. 0. 0.
731 *0. 0. 0.
926 *0. 0. 0.
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300 *0.77 26.22 20.19
294 *0.31 107.9 33.5
746 *0. 0. 0.
750 *0.61 49.1 29.95
1022 *0. 0. 0.
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*0.31 113.3 36.1
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740 *0. 0. 0.
707 *0. 0. 0.
1021 *0.83 48.9 40.6
710 *0. 0. 0.
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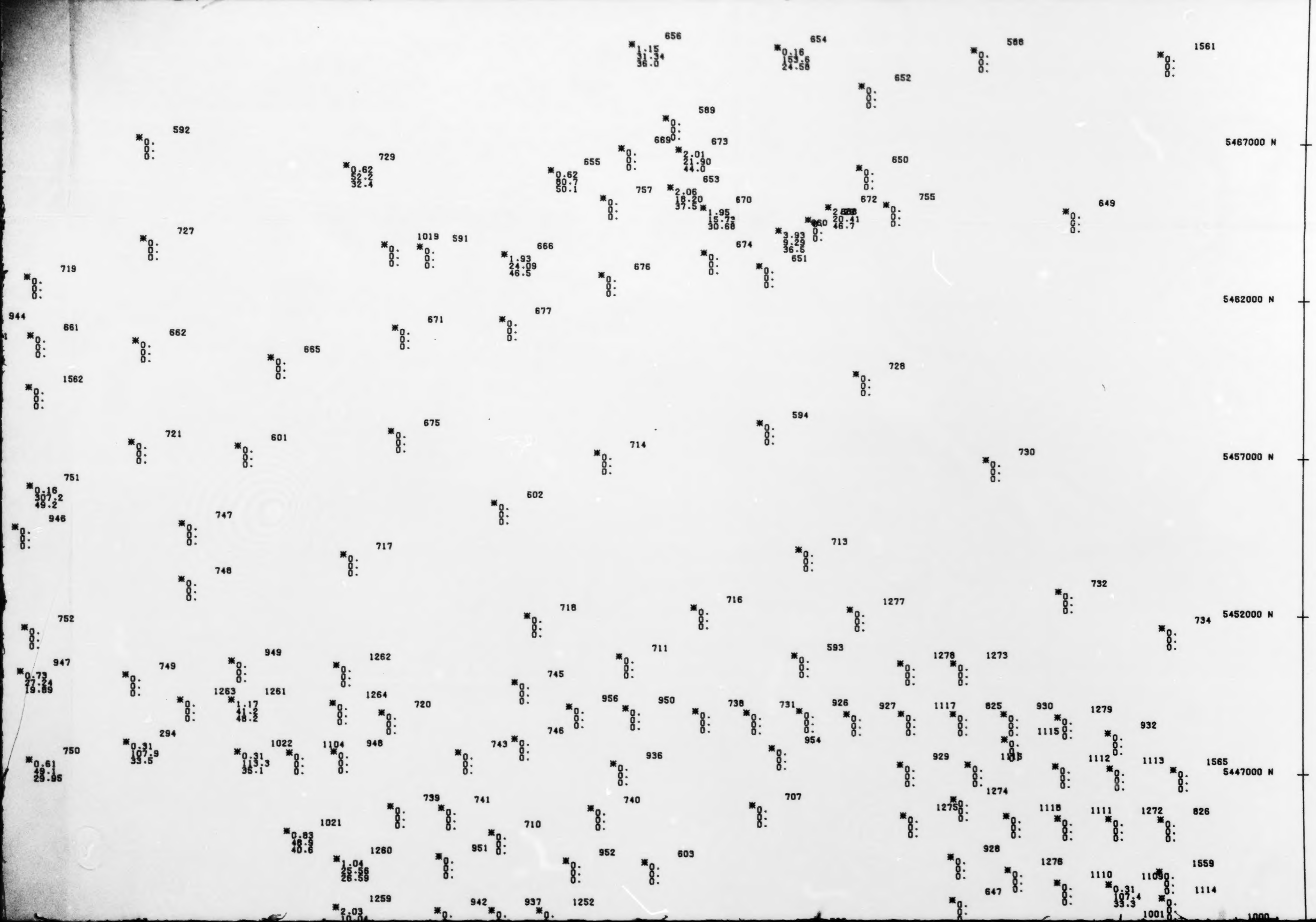
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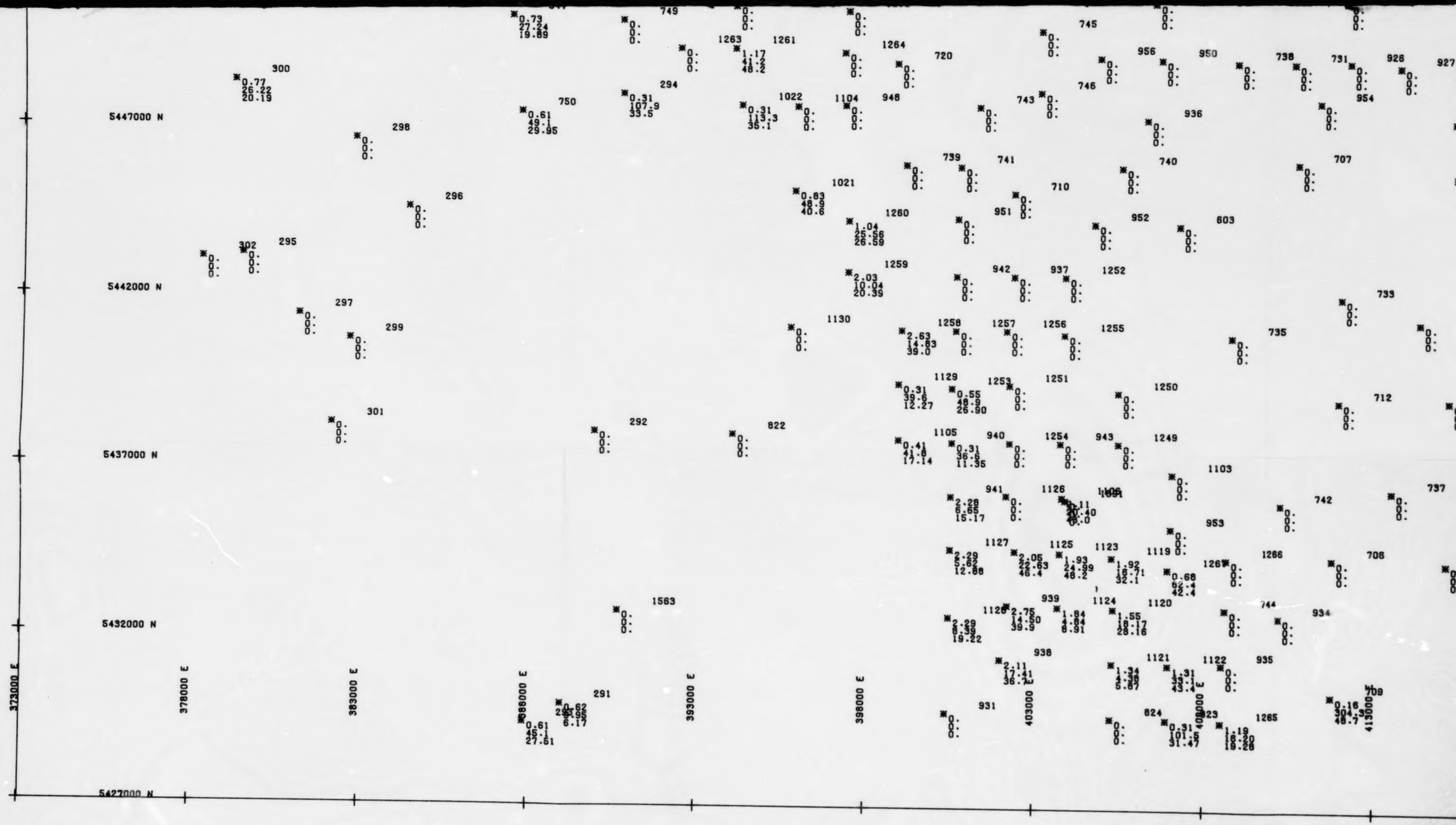
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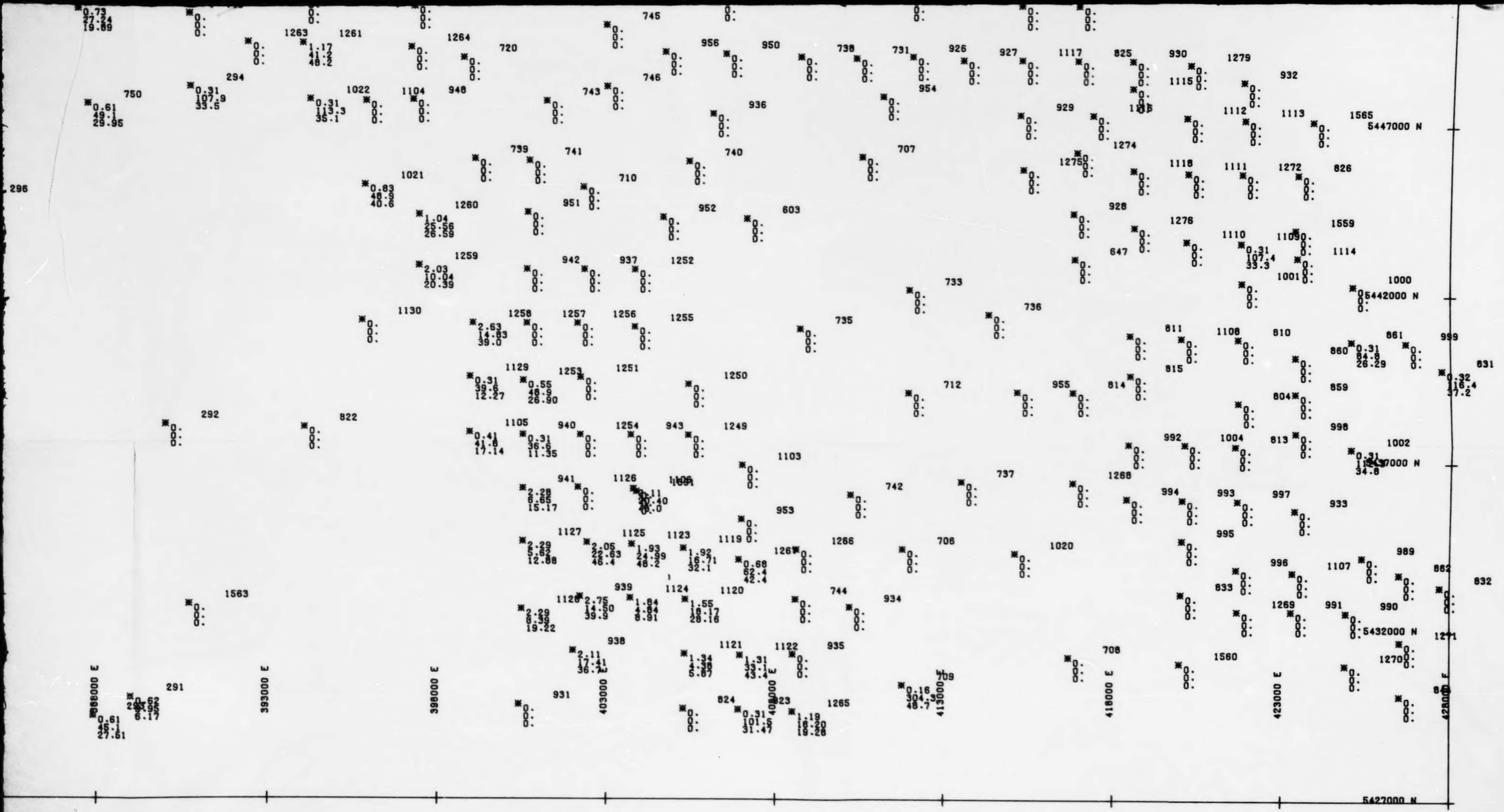
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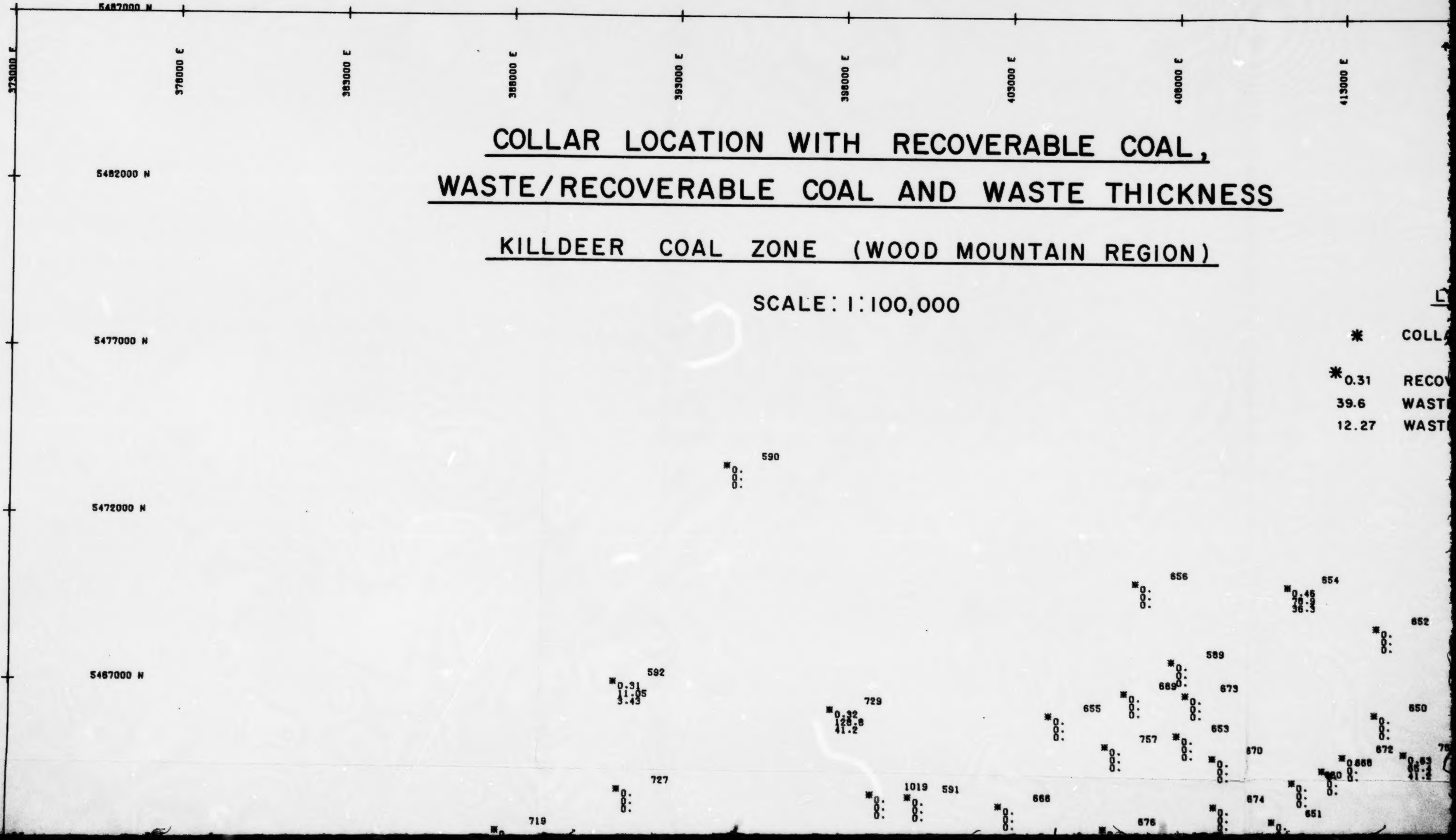
COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000



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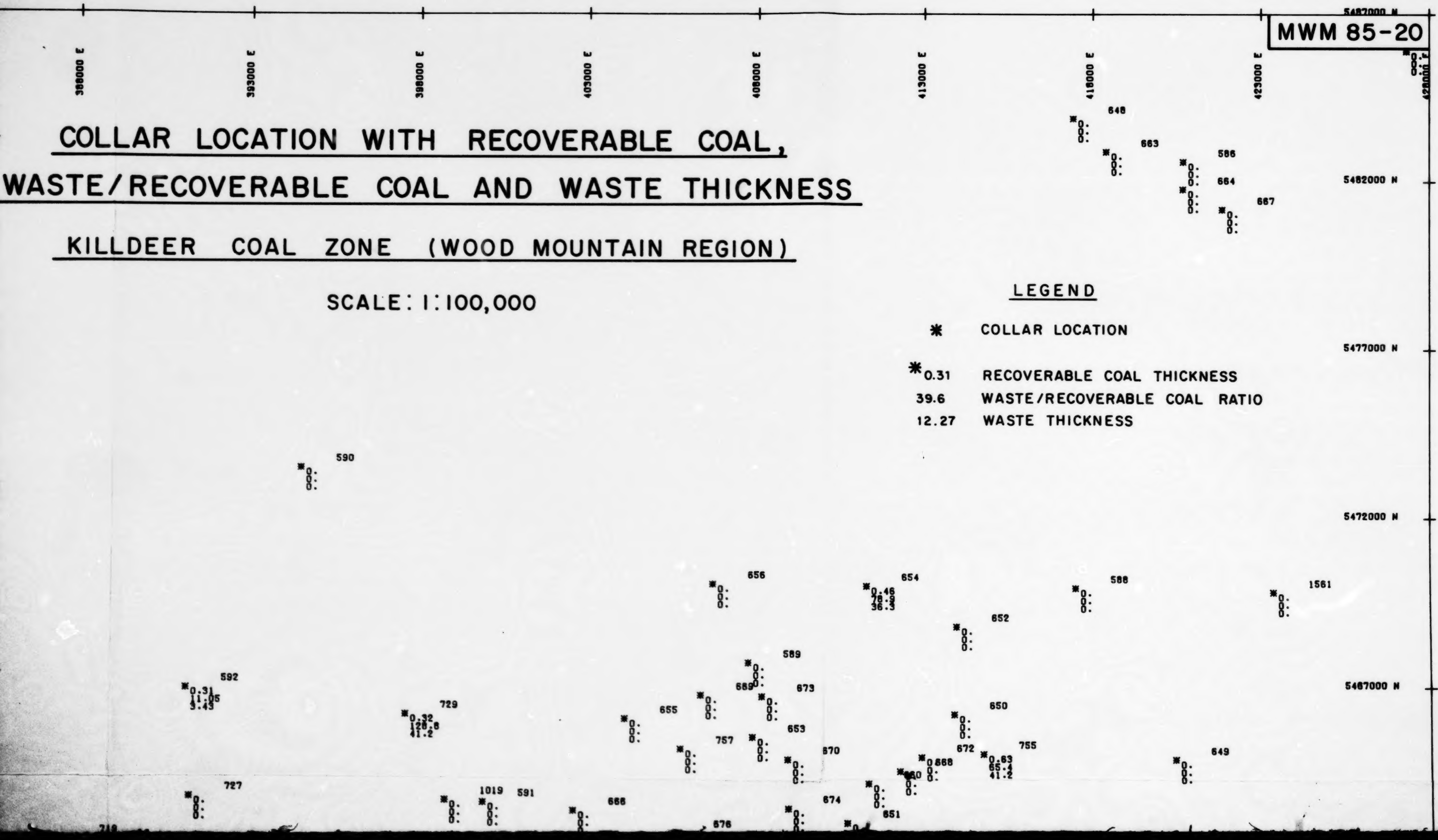
✱	COLL
✱0.31	RECO
39.6	WAST
12.27	WAST

MWM 85-20

COLLAR LOCATION WITH RECOVERABLE COAL, WASTE/RECOVERABLE COAL AND WASTE THICKNESS

KILLDEER COAL ZONE (WOOD MOUNTAIN REGION)

SCALE: 1:100,000



LEGEND

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39.6	WASTE/RECOVERABLE COAL RATIO
12.27	WASTE THICKNESS

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413000 E
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423000 E
428000 E
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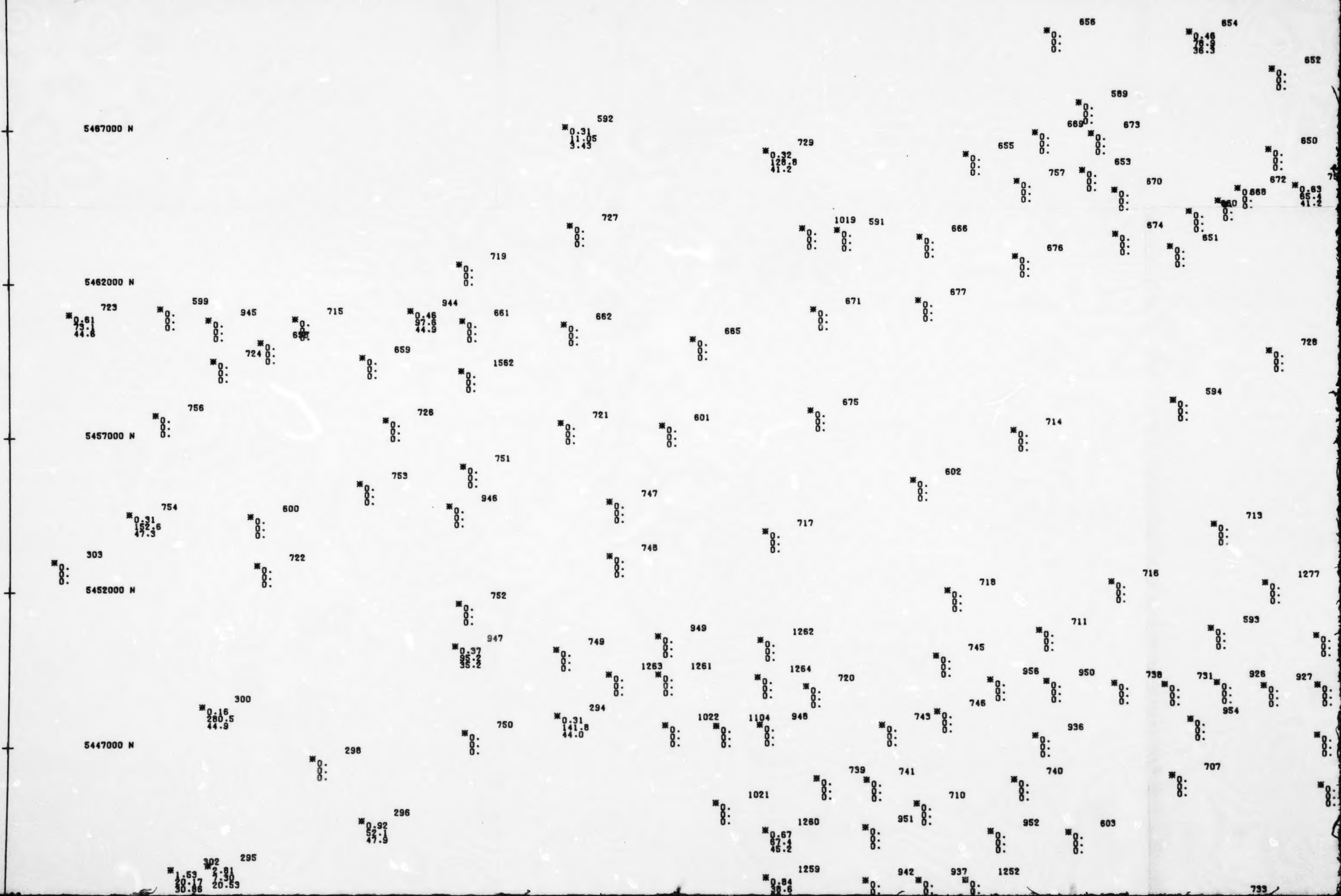5467000 N
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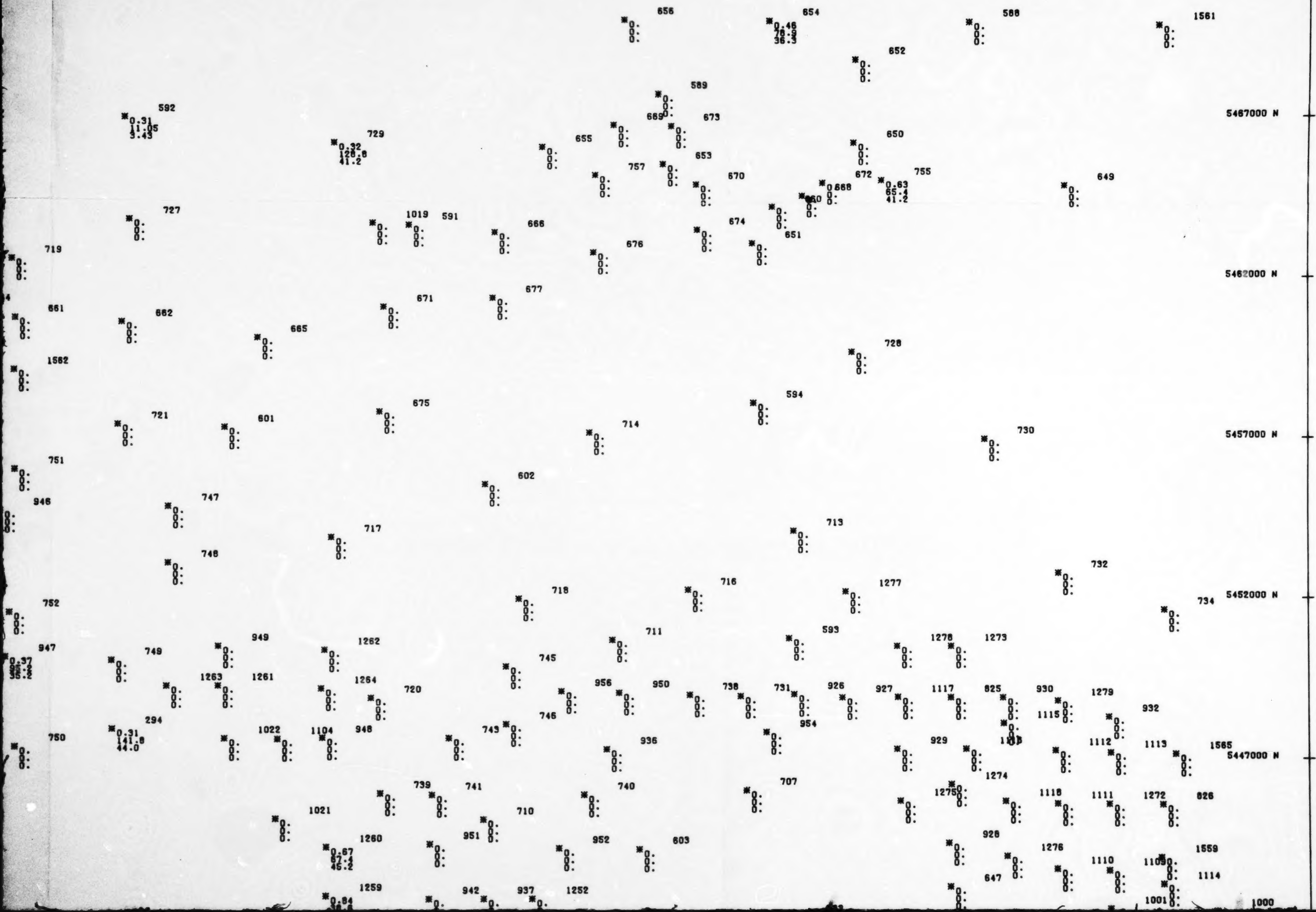

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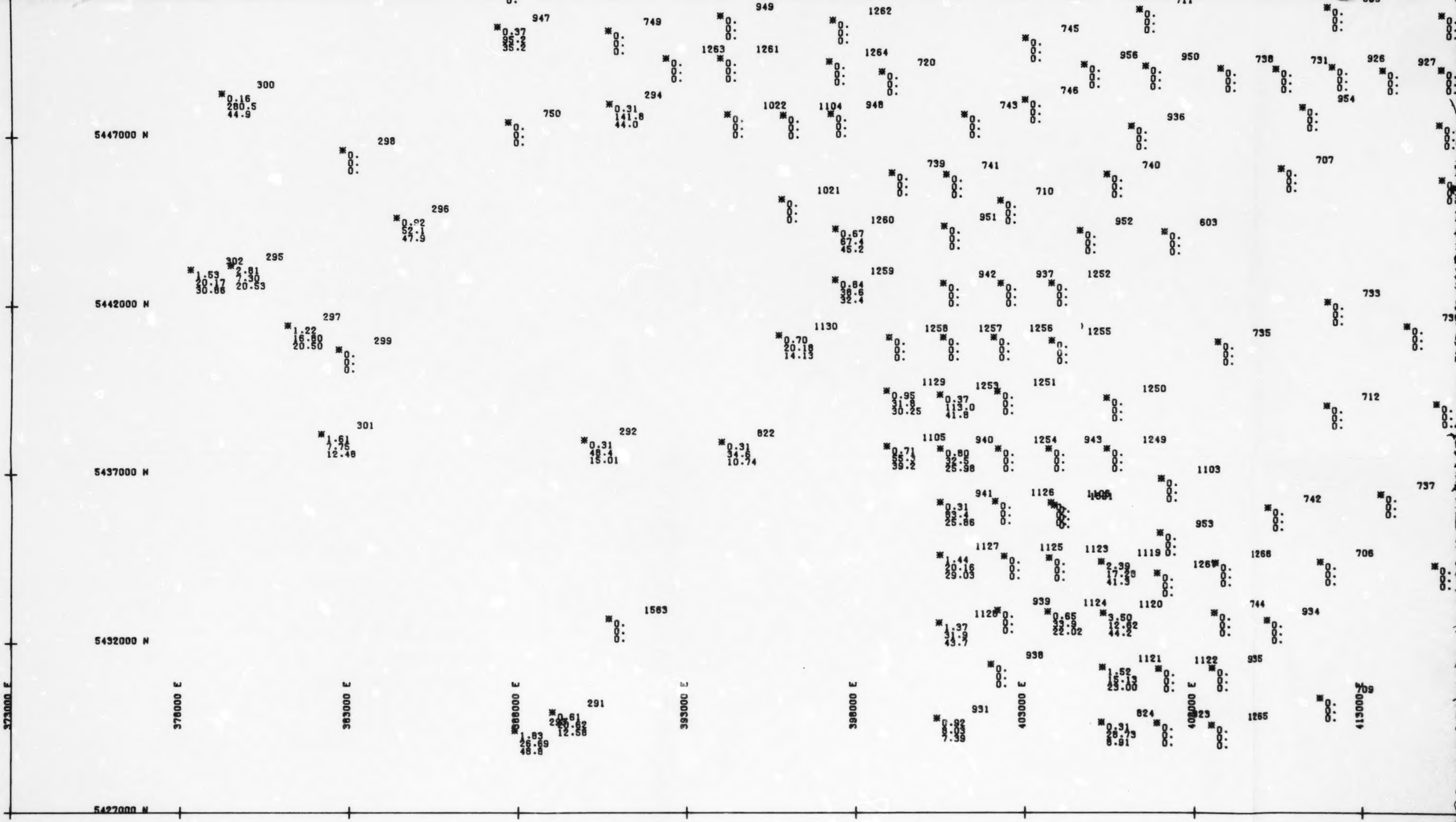
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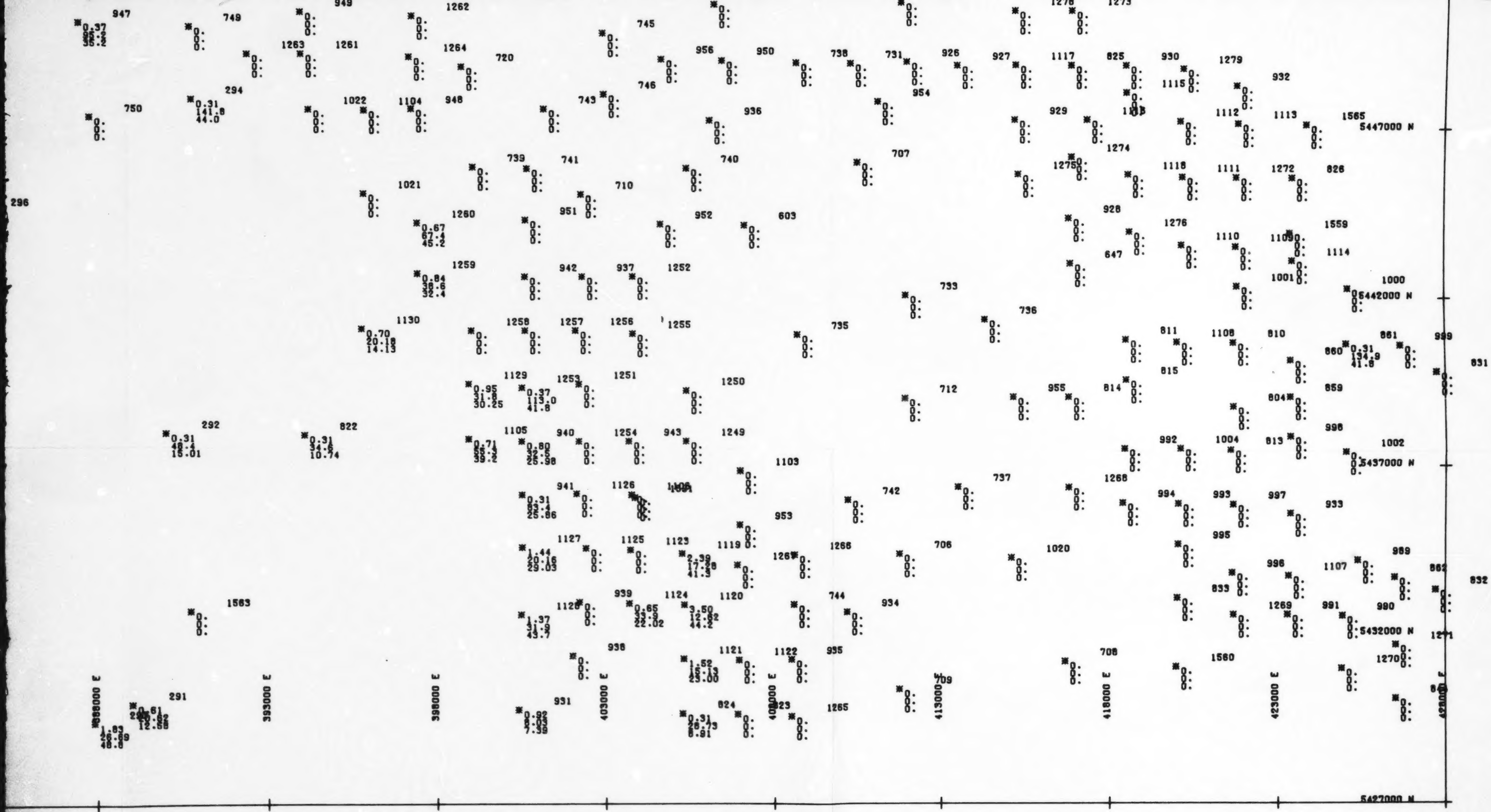

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